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MONTANA'S ABANDONED MINE LAND (AML) STATE RECLAMATION PLAN

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In Response to
TITLE IV of PL 95-87

Prepared by:

Richard L. Juntunen, Program Manager, AML
Ben A. Mundie, Contractor, AML
Mark G. Carlstrom, Contractor, AML

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Reclamation Division
Montana Department of State Lands
Helena, Montana
March, 1980

MAY 1 8 1983

AMENDMENT TO:

MONTANA'S ABANDONED MINE LAND (AML)
STATE RECLAMATION PLAN

TO ACCOMPLISH:

EMERGENCY RECLAMATION
RESPONSIBILITY

Office of Surface Mining
Attn: Bill Thomas
Northwest Field Office
Box 1420
Mills, WY 82644

RE: Administration of Emergency Reclamation Program

Dear Mr. Thomas:

October 24, 1980, the Montana Abandoned Mine Land State Reclamation Plan was approved. The Department of State Lands was designated as the authorized agency to administer the Montana Abandoned Mine Reclamation Program.

In order to respond effectively to potential abandoned mine related emergencies, the Montana Abandoned Mine Reclamation Program elects to secure emergency reclamation responsibility.

The Department of State Lands is designated as Montana's representative for the Abandoned Mine Emergency Reclamation Program. The department will offer any assistance possible in pursuing the program and will coordinate efforts to secure approval of Montana's amended plan.

Commissioner Dennis Hemmer has informed me that his department is preparing the information requested for emergency program approval.

If I can be of further assistance, please do not hesitate to contact me.

Sincerely,

Ted Schwinden
Governor

(b) When Montana applied for approval of its Abandoned Mine Land Reclamation Plan, it submitted a legal opinion by John F. North as Special Assistant Attorney General which stated that the Montana Department of State Lands had authority to conduct an Abandoned Mine Land Reclamation Program. The state statutes referred to in that letter authorize the Department to expend federal funds for such reclamation. These statutes do not differentiate between funds for emergency projects or other types of projects. Therefore it is my opinion that these statutes (Sections 82-4-239, 82-4-323 and 82-4-424) authorize emergency projects as well as the type contemplated in the approved plan. This opinion was written by David W. Woodgerd, Chief Legal Counsel, Special Assistant Attorney General.

(c) (1) The purpose of the Montana Emergency Reclamation Program will be; to provide immediate action and funding to protect the public health, safety, and general welfare from an existing emergency situation.

(2) The Montana Abandoned Mine Reclamation Bureau will immediately notify the Office of Surface Mining, Wyoming State Office, that a suspected emergency situation exists. All efforts will be made to coordinate a site visit with OSM personnel. When applicable and necessary the OSM Western Technical Center will be consulted for technical expertise in emergency stabilization.

It is assumed the Crow Tribal Abandoned Mine Reclamation Program will address emergency projects on tribal lands in cooperation with the OSM.

(3) Land acquisition for emergency projects will follow the guidelines as stated in Montana's Approved State Plan. The state will acquire lands in emergency situations only where no other viable means are available to abate an immediate threat to human life. When land acquisition is necessary an appraisal will be immediately obtained using a Montana Department of Highways professional appraiser. When dealing with an emergency situation the Board of Land Commissioners will be immediately notified of any acquisition. Their decision will be made expediously.

(4) The policies and procedures for emergency reclamation on private and public lands will be the same as outlined in Section 884.13(c)(5) of the Approved Montana State Plan.

(5) The policies and procedures for emergency project consent for right of entry shall be:

If the Montana Department of State Lands in conjunction with the Office of Surface Mining make a finding of fact that an emergency situation exists:

a. all reasonable actions will be made to obtain written consent from the owner of record of the land to be entered upon; and

b. all reasonable actions will be made to have the owner of record present at the initial site investigation with OSM.

A determination that an emergency situation exists when:

a. land or water resources have been adversely affected by past coal mining practices; and

b. the adverse effects are at a stage where in the public interest action to restore, reclaim, abate, control, or prevent should be taken; and

c. the owners of the land or water resources where entry must be made to restore, reclaim, abate, control, or prevent the adverse effects of past coal mining practices are not known or readily available or the owners will not give permission for the Department or its agents, employees, or contractors to enter upon such property to restore, reclaim, abate, control, or prevent the adverse effects of past coal mining practices; then agents, employees, or contractors of the Department, after giving notice by mail to the owner, if known, or, if not known, by posting notice upon the premises

and advertising in a newspaper of general circulation in the county in which the land lies, may enter upon property necessary or expedient to restore, reclaim, abate, control, or prevent the adverse effects of past coal mining practices. This act is not an act of condemnation of property or of trespass but rather an exercise of the power granted by Sections 1 and 2, Article IX of the Montana Constitution.

(6) Public Participation

A public meeting was held on April 12, 1983 concerning the proposed amendment to the Approved Montana Abandoned Mine Reclamation State Plan. The news release and listing of newspapers and news organizations are included in Appendix I. The news release went out on March 17, 1983.

No unresolved controversies remained after the hearing. A thirty day comment period followed the meeting. The record of comments is included in Appendix II.

(7) Realty Function

The Department of State Lands will waive filing of a lien on emergency reclamation projects on private land because the reclamation work will benefit public health and safety of the greater community or area in which the reclamation is located.

(d) (1) The Montana Emergency Reclamation Program will be administered by the Department of State Lands, Abandoned Mine Reclamation Bureau (AMRB). Currently, the AMRB is comprised of a Bureau Chief, a Reclamation Specialist II, and a Reclamation Specialist I. The Montana Legislature has approved two (2) more full time positions for the AMRB. These two new positions will be used to hire an Office Manager - Grants Person and another Reclamation Specialist. Firms on contract with the AMRB provide the following services:

a. reclamation engineering and design;
b. small scale mapping and additional surveying; and
c. geotechnical studies and drilling.

(2) The Montana Abandoned Mine Reclamation Bureau has administered the Montana Abandoned Mine Reclamation Program for four (4) years. The same personnel have been with the program from the beginning. The AMR Bureau has the capability to be on a suspected emergency site within five (5) hours anywhere in the state. One staff member will follow through on each emergency project through construction completion. An emergency project will take precedence over on-going work. Manpower shortages are not expected to be a factor in running an emergency program.

In the four years of the Montana AMR Program every type of major abandoned mine land problem present in Montana has been addressed. These projects include:

a. culm bank and mine fires;

b. surface subsidence;

c. unobstructed mine openings; and

d. mine related residential flooding.

In administering the Montana Abandoned Mine Reclamation Program this agency has developed the technical skills to address the abandoned mine land related problems within Montana.

(3) The use of a helicopter will allow Montana AMR personnel to visit a suspected emergency site immediately. County courthouse records will be investigated during the initial visit to determine landownership and eligibility. Landowners will be contacted immediately. If contact with all appropriate landowners is not possible the policies and procedures outlined in Section (c)(5) above will be followed. One AMRB staff member will follow through each emergency project, coordinating all aspects. The assigned AMRB staff member will supervise and inspect an emergency project through the completion of reclamation construction. The final project report will be prepared and submitted in accordance with OSM guidelines.

(4) Montana Law 18-4-102, MCA, Purchases Exempt from General Requirements, states:

"(2) Likewise, when immediate delivery of articles or performance of service is required by the public exigencies, the article or service so required may be procured by open purchases or contract at the place and in the manner in which articles are usually bought and sold or the services engaged between individuals but under the direction of the Department."

The Montana Department of Administration has agreed to work closely with the AMR Bureau and to act as quickly as possible in an approved emergency situation.

(5) The accounting system currently used by the Department of State Lands and the State of Montana would also be used to handle any additional accounting necessitated by an Emergency Reclamation Fund Account.

This determination was made by the Department Accountant who foresees no problems handling a separate emergency account.

(6) The Montana AMR Program has shown over the past four years that it can efficiently address the diverse abandoned mine land related hazards found within the state. State-of-the-art technology and equipment have been used to successfully reclaim every project this agency has undertaken.

(e) (1) A map showing the areas in Montana that are susceptible to emergency situations is included as Appendix III.

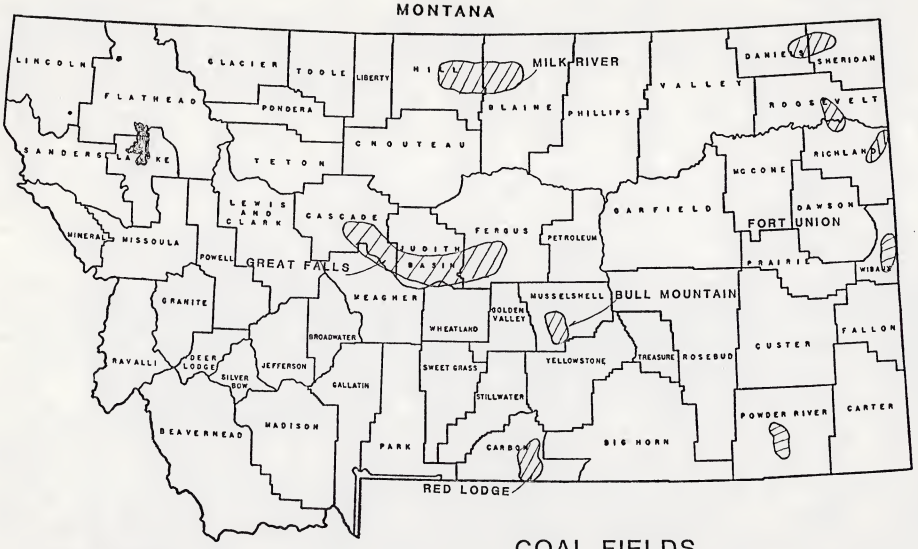
(2) A description of the emergency situations that may occur are listed by the respective coal field:

- Milk River Coal Field: Surface Subsidence
- Great Falls Coal Field: Surface Subsidence, Mine Fire, Residential Flooding
- Lewistown Coal Field: Surface Subsidence
- Red Lodge Coal Field: Surface Subsidence
- Bull Mountain Coal Field: Surface Subsidence, Culm Bank Fire
- Fort Union Coal Field: Surface Subsidence, Mine Fire

(f) The Montana Abandoned Mine Reclamation Bureau has completed ten (10) reclamation construction projects. Seven (7) reclamation construction projects are currently out for bid. The Scopes of Work and the Reclamation Construction Projects have addressed a range from extinguishing culm bank fires, subsidence control, pneumatic backfill of mine voids, closure of mine portals, to mine related flood control. Since October 1980 the Montana Abandoned Mine Reclamation Bureau has shown the capability to identify high priority projects, design reclamation construction specifications, select competent construction contractors, and supervise construction, in a timely manner.

With proper funding, the Montana Abandoned Mine Reclamation Bureau, working in cooperation with the Office of Surface Mining, has the experience and technical capability to design and supervise emergency reclamation construction.

APPENDIX III



No. 1050 — County Outline Map

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COAL FIELDS

THAT ARE SUSCEPTIBLE TO EMERGENCIES

Acknowledgement

The Montana Abandoned Mine Land staff expresses its appreciation for the personal assistance and information provided by the following agencies: Montana Board of Oil and Gas Conservation, Montana Bureau of Mines and Geology, Montana Department of Community Affairs, Montana Department of Highways, Montana Department of State Lands -- Coal, Hard Rock, and Opencut Bureaus, Montana Department of Fish, Wildlife, and Parks, Montana Department of Health and Environmental Sciences -- Water Quality Bureau, Montana Department of Intergovernmental Relations, Montana Department of Natural Resources and Conservation, Montana Historical Society, Montana State University, University of Montana, U.S. Bureau of Land Management, U.S. Bureau of Mines, U.S. Bureau of Reclamation, U.S. Office of Surface Mining, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, and the U.S. Soil Conservation Service.

Special mention should be made to acknowledge the following individuals' contributions to this plan: Jerry Burke, for his assistance in developing the graphics included in the plan; Dick Krott, for the fine work produced by his Graphic Service business; John North, for his sound legal advice; and Linda Wareham and Tressia Anderson, for typing and editing the plan.

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MONTANA'S ABANDONED MINE LAND (AML) STATE RECLAMATION PLAN

In Response to
TITLE IV of PL 95-87

Volume I

Part I: Authorization, Policies, Procedures, Administration, Management, and Public Participation - Montana AML Program

Part II: Parameters Relating to the Montana AML Reclamation Program

Prepared by:

Richard L. Juntunen, Program Manager, AML
Ben A: Mundie, Contractor, AML
Mark G. Carlstrom, Contractor, AML

Reclamation Division
Montana Department of State Lands
Helena, Montana
March, 1980

Introduction

On August 3, 1977, Congress passed Public Law 95-87, the "Surface Mining Control and Reclamation Act of 1977". Title IV of this Act, "Abandoned Mine Reclamation", established an Abandoned Mine Reclamation Fund and provided the authority to use monies from this fund to reclaim and restore land and water resources left or abandoned in either an unreclaimed or inadequately reclaimed condition after mining. Title IV of the Act provides that the fees shall be collected from all coal mining operations in a state according to the following schedule:

35¢/ton for surface mined coal (non-lignite)
15¢/ton for underground mined coal or 10% of the value of the coal at the mine, whichever is less
10¢/ton for lignite coal or 2% of the value of the coal at the mine, whichever is less

Additionally, monies may be collected from charges for the use of reclaimed lands after the cost of maintenance has been subtracted. Also, donations may be accepted from persons, corporations, associations, and foundations provided their monies can be used to meet the objectives of the State Reclamation Program.

Fifty-percent of such monies are set aside in a State Abandoned Mine Land (AML) Reclamation Fund, (up to 20%) is allotted to the Soil Conservation Service for use in the Rural Abandoned Mine Program, (RAMP), and the remainder is allotted to the Office of Surface Mining (OSM). Of the 30% OSM receives, 20% is used for the federal AML program, and of the funds OSM receives 10% or a maximum of $10 million is reserved to the Small Operator Assistance Program (SOAP), which assists coal operators in complying with the new surface mining regulations.

The Federal Act requires that Montana submit an Abandoned Mine Land Reclamation Program to the Department of Interior's Office of Surface Mining Reclamation and Enforcement (OSM) to assume jurisdiction over the expenditure of Montana's AML funds on AML problem areas within the state. The Montana Department of State Lands (DSL) has been designated by the Governor as the state agency to prepare Montana's AML program.

The Final Rules (30 CFR Chapter VII, Subchapter R) issued by the Office of Surface Mining Reclamation and Enforcement, Department of Interior, established the Abandoned Mine Land Reclamation program as required in Public Law 95-87, Title IV. These regulations establish procedures and requirements for the preparation, submission, and approval of State reclamation programs.

Mine sites left or abandoned in either an unreclaimed or inadequately reclaimed condition includes those lands and water:

(a) Where all mining processes ceased and no current permit for continiuing operations existed as of August 3, 1977, or, if a permit did exist on that date, but all mining processes had ceased, it has since lapsed and has not been renewed or superceded by a new permit as of the date of the request for reclamation assistance; and

(b) which continue, in their present condition, to substantially degrade the quality of the environment, prevent or damage the beneficial use of land or water resources, or endanger the health or safety of the public.

Lands and water within Montana are eligible for abandoned mined land reclamation activities if:

(a) They were mined for coal or affected by coal mining processes;

(b) they were mined prior to August 3, 1977, and left or abandoned in either an unreclaimed or inadequately reclaimed condition; and

(c) there is no continuing responsibility for reclamation by the operator, permittee, or agent of the permittee under state or federal statutes as a result of bond forfeiture renders lands or water ineligible only if the amount forfeited is sufficient to pay the total cost of the necessary reclamation. In cases where the forfeited bond is insufficient to pay the total cost of reclamation, additional monies from the Fund may be sought under 30 CFR 886 and 888.

Lands and water which were mined or affected by mining for minerals and materials other than coal shall be eligible for reclamation activities under the State Reclamation Program if the Director, Office of Surface Mining Reclamation and Enforcement, finds in writing that:

(a) The conditions (a-c) of the above paragraph have been met;

(b) the reclamation has been requested by the Governor of the State;

(c) all reclamation with respect to abandoned coal mine land and water has been accomplished within the state or the reclamation is necessary for the protection of the public health and safety; and

(d) monies allocated to the state under 30 CFR 872.11 (b) (2) and (3) are available for the work.

Part I contains the materials required by subsections (a-e) of 30 CFR 884.13, "Content of proposed State reclamation plan". The contents include: [884.13(a)] a designation of the Governor of the State of Montana authorizing the Montana Department of State Lands (DSL) as the agency to receive and administer grants under 30 CFR Part 886, [884.13(b)] the state's legal opinion that the DSL has the authority under State law to conduct the program, [884.13(c)] a detailed description of the policies and procedures to be followed by the designated agency in conducting the reclamation program, [884.13(d)] a detailed description of the administrative and management structure to be used in conducting the program, and [884.13(3)] a detailed description of public involvement in preparing the Montana AML State Reclamation Plan.

Descriptive narratives and introductory portions of the guidelines used in conducting DSL activities are included in Part I. Complete copies of referenced materials are available from the Montana Department of State Lands.

Part II contains the materials required by subsection (f)(5) of 30 CFR 884.13. The contents include a general description of the social, economic, and environmental conditions prevailing in the different geographic regions of the state.

Volume II of this report, "Montana AML Inventory, Problem Areas, and Reclamation", contains the materials required by subsections (f)(1-4) of 30 CFR 884.13. The contents include site description sheets and air photographs of the AML sites which have been ground checked. Included also is a description of the problem areas found in the state, a description of general reclamation techniques, the estimated quantities of acres and water disturbed, the list of verified AML coal and hard rock sites, the lists of potential AML coal and hard rock sites, a description of existing land use planning in Montana, and Montana Reclamation scheduling and cost proposals.

Part I

Authorization, Policies, Procedures, Administration, Management, and Public Participation Montana AML Program

Section 884.13(a)

Governor's letter designating the Montana Department of State Lands as the State Agency authorized to administer the State Reclamation Program and to receive and administer grants under 30 CFR Part 886.

State of Montana
Office of the Governor
Helena 59601

THOMAS L. JUDGE
GOVERNOR

November 15, 1977

Ms. Joan M. Davenport
Assistant Secretary of the Interior
Office of the Secretary
U.S. Department of the Interior
Washington, D.C. 20240

Dear Ms. Davenport:

I am in receipt of your letter dated November 4, 1977, regarding Title IV of the Surface Mining Control and Reclamation Act of 1977.

Montana is fortunate in that we have a reclamation program which applies to all mining activity regardless of the material being mined; that program is administered by the Department of State Lands. Unfortunately, funds have not been available to address many of the serious problems related to past mining activity, so a complete inventory of extreme danger areas has not been made. However, the department has identified some areas of immediate concern and has been in contact with some forest supervisors regarding potential dangers. As you know, Montana is not eligible to administer an abandoned mine program until its reclamation program is approved, so efforts have been concentrated on that approval.

The Department of State Lands is designated as Montana's representative for the abandoned mine reclamation program. The department will offer any assistance possible in pursuing the program and will coordinate efforts to secure approval of Montana's plan. Commissioner Leo Berry has informed me that his department will commence preparation of the information requested.

If I can be of further assistance, please do not hesitate to contact me.

Best regards.

Sincerely,

THOMAS L. JUDGE
Governor

bcc: Leo Berry

Section 884.13(b)

State's legal opinion that the Montana Department of State Lands has the authority under State Law to conduct the Montana AML Reclamation Program.

DEPARTMENT OF STATE LANDS

THOMAS L. JUDGE, GOVERNOR

CAPITOL STATION

STATE OF MONTANA

(406) 449-2074

LEO BERRY, COMMISSIONER

1625 ELEVENTH AVENUE
HELENA, MONTANA 59601

February 6, 1980

Donald Crane, Regional Director
Office of Surface Mining
U. S. Department of the Interior
Brooks Towers
1020 15th Street
Denver, CO 80202

Dear Mr. Crane:

This letter opinion is being written for submission with Montana's Proposed State Abandoned Mine Land Reclamation Plan as provided in CFR 884.13(b).

The Montana Department of State Lands is an agency of state government created pursuant to Section 2-15-3202 MCA. Section 82-4-239, 82-4-323, 82-4-424 authorizes the Department to expend funds received from the federal government for reclamation of lands which were mined for coal or uranium, hard rock minerals, or opencut mined minerals (sand, gravel, phosphate rock, bentonite, etc.) respectively, and left in an unreclaimed condition without any continuing obligation to reclaim.

The above referenced sections authorize the Department to conduct an abandoned mine land reclamation program in accordance with Title IV under Public Law 95-87, 30 CFR Chapter VII, Subchapter R, and the proposed state reclamation plan.

Sincerely,

John F. North

John F. North
Special Assistant Attorney General
State of Montana
Department of State Lands

by David W. Woodgerd
David W. Woodgerd

ta

Policies and Procedures

Section 884.13(c)(1) Goals and Objectives

The goals and objectives of the Montana AML State Reclamation Program are to protect and enhance the public health, safety, and general welfare from the adverse effects of past mining practices. To accomplish these goals the State Reclamation Program will address and deal positively with:

Acid Mine Drainage -- The bituminous coal mined from the Great Falls, Lewistown, and Red Lodge - Bridger coal fields contain highly reactive iron sulphide minerals which will produce toxic acid in the presence of air and water. Acid mine drainage is a serious problem in the Sand Coulee and Belt areas. Metal mining in the mountainous regions of Montana has also exposed reactive minerals which create acid water quality problems in some of Montana's most pristine surface waters. Both surface and groundwater, public and private domestic water supplies, along with aquatic and wildlife habitat, have been affected by acid mine drainage. Over 190 miles of total stream length are affected by acid mine drainage in central and western Montana.

Open Entrances -- Accessible adits and shafts are found throughout the coal fields of central and eastern Montana. These same conditions exist in the metal mining districts of western Montana. Public safety is threatened by the accessibility of dangerous open adits and shafts.

Subsidence -- Underground coal mining in the Great Falls, Red Lodge - Bridger, and Fort Union coal fields has left areas in and around the communities of Sand Coulee, Red Lodge, Coalridge, Miles City, and Fairview unstable due to land subsidence. Additionally, subsidence of some degree occurs in all the mining regions of the State. Over 3200 acres of land are affected by subsidence due to underground coal mining in Montana. Roads, structures, and agricultural lands are affected and threatened.

Erosion and Sedimentation -- Barren mine waste dumps, typically located in drainages in contact with streams, are acted upon by wind and water creating adverse air and water quality problems. This condition exists in all the mining regions in Montana. Toxic minerals in the mine waste dumps are leached out by high water flows, precipitation, and runoff, adding to the chemical load of many streams.

Burning Mine Waste Dumps -- Coal waste dumps with only a small percentage of coal content can and will burn primarily due to spontaneous combustion. A 21,000 acre forest fire southeast of Roundup, Montana in December, 1979, was allegedly

started by burning coal mine waste dumps. Though not a widespread problem, 3 sites in Montana have been identified. Toxic gases, smoke, and threat of forest and range fire are problems associated with burning mine waste dumps that need to be rectified.

Old Mine Structures -- Mine related structures in varying stages of deterioration are found in all the mining regions of Montana. These structures pose a serious threat to the curious and unwary. No structure would be removed without landowner cooperation, and a professional survey to determine cultural and/or historic significance.

Aesthetic disamenties -- Abandoned mine sites can contribute to several forms of aesthetic disamenties: excavation and road-cuts, abandoned buildings and machinery, waste dumps, and disturbed lands and water. Where exposure to the public is high, AML sites that receive reclamation funds shall be reclaimed for enhanced visual quality.

The current scope of the plan is three (3) years based on current data availability. Within the 3 year time frame, relevant studies and projects should be complete and will be incorporated into the first update to the Montana AML State Reclamation Plan. These studies include:

--The completion of the county land use maps by the Montana Department of Community Affairs. A two year completion date has been set. This data will assist in determining the priority ranking and degree of reclamation of individual AML sites.

--To determine the feasibility of an acid mine drainage abatement/treatment plan for the Sand Coulee-Belt and Prickly Pear drainages. Qualified consulting firms are to be contracted to develop acid mine drainage abatement plans for coal and non-coal AML sites in Montana. These studies should be completed by the 1982 field season, and would be used in the first AML reclamation plan amendment as guidelines for acid mine reclamation.

--Extensive water quality studies of the Prickly Pear basin, south of Helena are being conducted to determine the adverse impacts of acid mine drainage and sedimentation of past mining activities. This study will be conducted by the Montana Water Quality Bureau and the Reclamation Division of the Department of State Lands. This project should be completed by the 1981 field season.

--Completion of the inventory of eligible AML sites in the State of Montana. This includes air photography and ground site verification.

--Refine ground survey and aerial photography techniques for compiling data for constructing topographic maps of eligible AML sites.

During the 1980 field season Montana's AML staff will complete the field inventory of suspected coal and non-coal AML sites, and acquire the remaining low level air photos needed of eligible AML sites in Montana. This completed data will be included in the first update of the reclamation plan.

Section 884.13(c)(2) Reclamation Project Ranking and Selection

Montana will rank and select abandoned mine land projects based on the following three-stage approach:

1. AML reclamation projects will initially be ranked into the categories as defined in Montana's Permanent Program Rules ARM 26.4.1234, 124, and 224 (Appendix I, page 50).

2. All proposed AML reclamation projects in the categories defined in stage one will be evaluated regarding the following key question (ARM 26.4.1235(2), 125(2), and 224,(2)):

   -- Is technology available to accomplish reclamation work with reasonable assurance of success? In the case of research and development projects, do the research capability and plan provide reasonable assurance of beneficial results without residual adverse impacts?

3. Those projects which have not been eliminated during the stage two evaluation, will be prioritized based on a project scoring and weighting scheme. Each of a series of a significant parameters will be scored on a 0 to 3 scoring scale to determine the current relative local and/or regional impacts of the problem site being evaluated on that parameter. The 0 to 3 scoring will indicate impacts as follows:

   0 - none
   1 - minimal
   2 - moderate
   3 - extreme

   The parameters of the existing site to be evaluated to characterize problem site impacts (adopted from ARM 26.4.1235 (3-8), 125 (3-8), and 225 (3-8)) are shown in the project ranking matrix (Figure 1). The score (0-3) will then be multiplied by a weighting factor assigned to that parameter which will indicate its significance relative to all other parameters.

   Completed reclamation shall be evaluated in terms of the procedure outlined above as a means of identifying conditions which should be avoided, corrected, or improved in plans for future reclamation work.

Figure 1 -- Project Ranking Matrix

Site Name: _____

	PARAMETER	NONE	MINIMAL	MODERATE	EXTREME	A	B	
ENVIRONMENTAL	Human Life, Health & Safety	0 points No impact	1 point Potential Adverse Impact	2 points Potential Adverse Impact (Severe)	3 points Current Adverse Impact (Severe)	Parameter Score	Weighting Factor X 15	Final Score
	Water Quality	No impact	Less than 1 mi. down-stream impact	1-10 miles downstream impact	Greater than 10 mi. down-stream impact		10	
	Air Quality	No impact	Occasion-al fumes or fugi-tive dust.	Fugitive dust, Noxious odors, smoke, particu-lates	High levels pollutants		10	
	Fish, Wildlife, and Plant Habitat	No adverse impact	Low impact	Moderate impact	High impact		5	
	Aesthetics	No impact	Low Public value	Moderate Public value	High public value		2	
	Public Visibility	Remote	>10 mi. to high-way & town	1-10 mi. to high-way & town	<1 mi. to highway & town		5	
	Historic, Cultural & Recreational	No sites	Proxi-mity to sites	Close proxi-mity to sites	Major tourist sites in area		5	
SOCIO-ECONOMIC	Property Ownership		Private		Public		5	
	Adjacent Land Use	Mining	Forest, Agricul-ture	Residen-tial, commercial	Recreation (Parks, reservoirs)		4	
	Affected Population	None	1-500 persons	500-2500 persons	Over 2500 persons		5	

Site Parameters

continued on next page...

Figure 1 -- Project Ranking Matrix (continued)

Action Parameters

LAND USE UTILIZATION

PARAMETER	NONE	MINIMAL 1	MODERATE 2	EXTREME 3	A	B	FINAL
Potential Productivity of Affected Area	None	Forest	Pasture, Range	Cropland		4	
Productivity of Adjacent Area	None	Forest	Pasture, Range	Cropland		5	
Residential, Industrial, & commerical development	Low potential	Possible	Long range potential	High Potential		5	
Potential for Future Mining	High			Low		10	
Demonstration of Enhanced Reclamation Technology	Probability of Success	Low	Moderate	High		3	
Cost Effectiveness of Reclamation		Low	Moderate	High		8	

SOURCE: Skelly & Loy, May 1979

COUNTY: _____ TOTAL FINAL SCORE: _____

SITE NAME: _____

LOCATION: _____

QUAD MAP: _____

Section 884.13(c)(3) Coordination of Agencies

The Soil Conservation Service (SCS) administers the Rural Abandoned Mine Program (RAMP) in Montana. The Department of State Lands Reclamation Division administers the Montana AML Program. In developing an inventory and a state reclamation plan for the Montana AML Program a good working relationship has been fostered between the SCS and the Montana AML staff.

In January 1979, a State Reclamation Committee was formed. This committee is composed of members from the following agencies or organizations:

Montana Board of Natural Resources and Conservation
Montana Department of Natural Resources and Conservation
Montana Department of Health and Environmental Sciences
Montana Department of Agriculture
Montana Department of Fish, Wildlife and Parks
Montana Extension Service
Montana Association of Conservation Districts
Montana Department of State Lands - AML staff
Soil Conservation Service
Office of Surface Mining (OSM)

The State Reclamation Committee reviews and determines priorities for the various RAMP projects in Montana. Participation on the State Reclamation Committee by the SCS, Montana AML staff and OSM insures that duplication of effort in the field of abandoned mine reclamation can be avioded.

The agencies and organizations involved with the State Reclamation Committee will be given adequate time to review and comment on proposed RAMP AML projects in Montana.

The SCS has received three applications for reclamation projects from private individuals. SCS and Montana AML personnel were present for the initial field inspections of the potential RAMP projects and both agencies will be represented in the field when reclamation plans are proposed.

The Montana AML staff has been working in close cooperation with the Montana Department of Health and Environmental Sciences - Water Quality Bureau in the area of AML impacted waters. Such coordination of activities has allowed both agencies to avoid duplication of effort in water quality data collection. Cooperative Agreement to provide for testing of water samples by Water Quality Bureau for the Montana Department of State Lands is shown as Figure 30 on page 168.

The Montana AML staff has and will coordinate efforts with the Montana Historical Society in identifying those AML sites that contain relevant cultural and historic significance. The Montana Historical Society is responsible for State Historic Preservation Act (SHPA) and reviews all projects through the A-95 clearing house process.

Protection of Rare and Endangered Species in the state of Montana is handeled by the Montana Department of Fish, Wildlife and Parks who review each project through the A-95 clearinghouse process, and the U.S. Fish and Wildlife Service who will be contacted on any chance of encounter with Rare and Endangered Species or Eagles in an AML project.

All current and proposed mining operations in the state of Montana are administered through the Montana Department of State Lands, Reclamation Division. Close coordination within the Reclamation Division between the AML, Coal, Hard Rock, and Opencut Bureau, will determine whether or not a projected AML site lies within a mine permit area. Where a potential AML site is located within a valid mine permit area, the current mine operator may be responsible for performing the necessary reclamation work in the permit area.

All agencies in Montana which deal with environmental matters will cooperate under the "Montana Environmental Policy Act" Figure 29, page 167. Every agency has agreed to this policy and expertise transfer across agency lines will be available on all AML projects.

Reclamation on Federal Lands

Twenty-nine percent of Montana is federally owned. The bulk of these federally owned lands include national forests, national parks, national wildlife refuges, and BLM administered lands. When a Montana AML project involves federal surface/mineral rights, an agreement between the state of Montana and the United States of America, Department of the Interior, Office of Surface Mining, and the Federal land management agency will be utilized to provide a cooperative solution to AML problems. Federal discretionary funds will be used for these projects. If federal discretionary funds are not available and the project is of high priority, then state reclamation funds will be used. All work on these projects will be overseen by the Montana AML staff with OSM serving an advisory role.

Reclamation on Indian Lands

The Montana AML staff has and will assist the Indian tribes of Montana in developing their Indian reclamation programs. However, the State of Montana assumes that the tribes will handle inventorying and reclamation of eligible AML sites on their own lands. The Montana AML Program is not inventorying or working on AML projects on tribal lands.

Section 884.13(c)(4) Policies and Procedures for Land Acquisition, Management, and Disposal

Coal

The Department of State Lands will obtain an appraisal of the fair market value of all land or interest in land to be acquired, by a professional appraiser. The appraisal will state the fair market value of the land as adverselty affected by past mining and will otherwise conform to the requirements of the handbook on "Uniform Appraisal Standards for Federal Land Acquisitions" (Inter-Agency Land Acquisition Conference, 1973).

When practical acquisition will be by purchase from a willing seller. The amount paid for interests acquired will reflect the fair market value of the interests as adversely affected by past mining.

When necessary, for reclamation activities land or interests in land may be acquired by condemnation. Condemnation procedures will not be started until allreasonable efforts have been made to purchase the land or interests in lands from a willing seller. See Section 26.4.1237 in figure 25 & 25a, pages 160 and 161.

When acquiring land, the Board of Land Commissioners will comply, at a minimum and to the extent applicable, with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, 42 U.S.C. 4601, et seq; 41 CFR Part 114-50; Solicitor of the Interior's regulations for Approval of Title to Lands and Condemnation, I SRM 6.1 et seq; and regulations of the Attorney General under Order No. 440-70 dated October 2, 1970, establishing standards for title approval of lands to be acquired for federal public purposes. All acquired land will be recorded with the appropriate county Clerk and Recorder and Title will be recorded in the name of the State of Montana.

Hard Rock and Opencut

The Department of State Lands will obtain an appraisal of all land or interest in land to be acquired, by a professional appraiser. The appraiser will state the fair market value of the land as adversely affected by past mining and will otherwise conform to the requirements of the handbook on "Uniform Appraisal Standards for Federal Land Acquisitions" (Inter-Agency Land Acquition Conference, 1973). Acquisitions will be by purchase from a willing seller. The amount paid for interests acquired will reflect the fair market value of the interests as adversely affected by past mining. See Section 26.4.127, figure 26 and 26a pages 162, 163; figures 27 and 27a pages 164 and 165.

When acquiring land, the Board of Land Commissioners will comply, at a minimum and to the extent applicable, with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, 42 U.S.C. 4601, et seq; 41 CFR Part 114-50; solicitor of the Interior's regulations for approval of title to lands and condemnation, I SRM 6.1 et seq; and regulations of the attorney general under Order No. 440-70 dated October 2, 1970, establishing standards for title of lands to be acquired for federal purposes. All acquired land will be recorded with the appropriate County Clerk and Recorder and Title will be recorded in the name of the State of Montana.

Acceptance of Gifts of Land

The Board of Land Commissioners may accept donations of title to land or interest in land that is necessary for reclamation activities. A donation will not be accepted if the terms or conditions of acceptance are inconsistent with the objectives or requirements of the program.

Offers to make a gift of such land or interest in land will be in writing and will include:

(a) a statement of the interest which is being offered;
(b) a legal description of the land and a description of any improvements on it;
(c) a description of any limitations on the title or conditions as to the use or disposition of the land existing or to be imposed by the doner;
(d) a statement that:
(i) the offeror is the record owner of the interest being offered;
(ii) the interest offered is free and clear of all encumbrances except as clearly stated in the offer;
(iii) there are no adverse claims against the interest offered;
(iv) there are no unredeemed tax deeds outstanding against the interest offered; and
(v) there is no continuing responsibility by the operator under state or federal statutes for reclamation;
(e) an itemization of any unpaid taxes or assessments levied, assessed or due which could operate as a lien on the interest offered.

If the offer is accepted, a deed of conveyance shall be executed, acknowledged, and recorded. The deed shall state that it is made "as a gift under the Montana Strip and Underground Mine Reclamation Act, the Montana Hard Rock Mining Act, or the Montana Opencut Mining Act", whichever is appropriate. Title to donated land shall be in the name of the State of Montana.

Management of Acquired Lands

Land acquired through the procedures described above may be used pending disposition for any lawful purpose that is not inconsistent with the reclamation activities and post-reclamation uses for which it was acquired. Any user of the acquired land will be charged a use fee. The fee will be determined on the basis of the fair market value of the benefits granted to the user, charges for comparable uses within the surrounding area, or the costs to the Department of State Lands for providing the benefit, whichever is appropriate. All use fees collected will be deposited in the Abandoned Mine Land fund unless previously appropriated by the legislature for specific purpose of operating and maintaining improvement of the land.

Disposition of Reclaimed Lands

Prior to the disposition of any land acquired, the Board of Land Commissioners will:

(a) publish a notice which describes the proposed disposition of the land in a newspaper of general circulation within the area where the land is located for a minimum of 4 successive weeks. The notice will provide at least 30 days for public comment and state where copies of plans for disposition of the land may be obtained or reviewed and the address to which comments on the plans should be submitted; the notice will also state that a public hearing be held if requested by any person;

(b) (after notice thereof) hold a public hearing if requested, (the department has the inherent authority to hold a hearing without request from public)as a result of the public notice, which hearing will be scheduled at a time and place that affords local citizens and governments the maximum opportunity to participate. All comments received at the hearing will be recorded.

(c) make a written finding that the proposed disposition is appropriate considering all comments received and consistent with any local, state, or federal laws or regulations which apply.

The Board may transfer, with approval of the regional director, the administrative responsibility for land acquired under this part, to any agency or political subdivision of the State with or without cost to that agency. The agreement, including amendments, under which a transfer is made will specify:

(a) the purposes for which the land may be used consistent with the authorization under which the land was acquired; and
(b) that the administrative responsibility for the land will revert to the department, if at any time in the future, the land is not used for the purpose specified.

The Board with the approval of the regional director may sell land acquired under this part by public sale if such land is suitable for industrial, commerical, residential, or recreational development and if such development is consistent with local, state, or federal land use plans for the area in which the land is located and retention on other disposal action is not in public interest. Land will be sold for not less than fair market value under a system of competitive bidding which includes at a minimum:

(a) publication of a notice once a week for 4 weeks in a newspaper of general circulation in the locality in which the land is located; the notice will describe the land to be sold, state the appraised value, state any restrictive covenants which will be condition of the sale, and state the time and place of the sale; and
(b) provisions for sealed bids are to be submitted prior to the sale date followed by an oral auction open to the public.

All monies received from disposal of land under this subsection will be deposited in the Abandoned Mine Reclamation fund.

Appraisal and Liens

A. COAL

When applicable a notarized appraisal of the full market value of private land to be reclaimed will be obtained by the Board of Land Commissioners from an independent professional appraiser. Such appraisal will meet the quality of appraisal practices found in the handbook on "Uniform Appraisal Standards for Federal Land Acquisitions" (Inter-Agency Land Acquisitions Conference, 1973). The appraisal will be obtained before any reclamation activities are started, unless the work must start because of an emergency. The appraisal will be completed at the earliest practical time and before related non-emergency work is commenced. The appraisal will state the full market value of the land as adversely affected by past mining.

An appraisal of the full market value of all land reclaimed will be obtained after all reclamation activities have been completed. The appraisal will be obtained as described above and will state the market value of the land as reclaimed.

The landowner will be provided with a statement of the increase in market value, an itemized statement of reclamation expenses and notice of whether a lien will or will not be filed.

The Department may place a lien against coal land reclaimed if the reclamation results in an increase in the fair market value based on the appraisals. The amount reported to be the increase in value of the property shall constitute the amount of the lien.

A lien shall not be placed against the property of a surface owner who acquired title prior to May 2, 1977, and who did not consent to, participate in, or exercise control over the mining operation which necessitated the reclamation work.

The Department may waive filing of the lien if the cost of filing it, including indirect costs to the Department, exceeds the increase in fair market value as a result of reclamation activities.

The Department may waive filing of the lien if the reclamation work performed on private land primarily benefits health, safety, or environmental values of the greater community or area in which the land is located, or if reclamation is necessitated by an unforeseen occurrence and the work performed to restore that land will not result in a significant increase in the market value of the land as it existed immediately before the occurrence.

If a lien is to be filed, the Department will, within 6 months after completion of the reclamation work, file a statement in the office of the County Clerk and Recorder of the county in which the property is located. Such statement will consist of an account of monies expended for the reclamation work, together with notarized copies of the appraisals obtained as described above.

The Department will maintain or renew a lien on private property from time-to-time as may be required by law. A lien placed on private property will be satisfied to the extent of the value of the consideration received at the time of transfer of ownership.

Any unsatisfied portion shall remain as a lien on the property and shall be satisfied in accordance with this paragraph.

B. NON-COAL

When applicable the Department will enter into a contract with a private landowner to create a lien on reclaimed property.

If the landowner of a non-coal project will not enter into a lien by contract with the Department, that non-coal reclamation project will not proceed.

If the Department finds that the reclamation of eligible non-coal sites primarily benefits the health, safety, and environmental values of surrounding communities and the general public, the Department may waive the placing of a lien.

Section 884.13(c)(5) Reclamation on Private Land

Coal

Reclamation activities may be carried out on private land if a consent to enter is obtained or if the Department of State Lands (Department) makes a finding of fact that:

(a) land or water resources have been adversely affected by past coal mining practices; and

(b) the adverse effects are at a stage where in the public interest action to restore, reclaim, abate, control, or prevent should be taken; and

(c) the owners of the land or water resources where entry must be made to restore, reclaim, abate, control, or prevent the adverse effects of past coal mining practices are not known or readily available or the owners will not give permission for the Department or its agents, employees, or contractors to enter upon such property to restore, reclaim, abate, control, or prevent the adverse effects of past coal mining practices; then agents, employees, or contractors of the Department, after giving notice by mail to the owner, if known, or, if not known, by posting notice upon the premises and advertising in newspaper of general circulation in the county in which the land lies, may enter upon property adversely affected by past coal mining practices and any other property necessary for access to such mineral property to do all things necessary or expedient to restore, reclaim, abate, control, or prevent the adverse effects of past coal mining practices. This act is not an act of condemnation of property or of trespass but rather an exercise of the power granted by Sections 1 and 2, Article IX of the Montana Constitution.

MONTANA CONSTITUTION ARTICLE IX

Section 1. Protection and improvement. (1) The state and each person shall maintain and improve a clean and healthful environment in Montana for present and future generations.
(2) The legislature shall provide for the administration and enforcement of this duty.
(3) The legislature shall provide adequate remedies for the protection of the environmental life support system from degradation of natural resources.

Section 2. Reclamation. (1) All lands disturbed by the taking of natural resources shall be reclaimed. The legislature shall provide effective requirements and standards for the reclamation of lands disturbed.
(2) The legislature shall provide for a fund, to be known as the resource indemnity trust of the state of Montana, to be funded by such taxes on the extraction of natural resources as the legislature may from time to time impose for that purpose.
(3) The principal of the resource indemnity trust shall forever remain inviolate in an amount of one hundred million dollars ($100,000,000), guaranteed by the state against loss or diversion.

Hard Rock and Opencut

Reclamation activities may be carried out on private land if a consent to enter is obtained from the owner.

Section 884.13(c)(6) Consent of Entry

Coal

The Department of State Lands (Department) will take all reasonable actions to obtain written consent from the owner of record of the land or property to be entered in advance of such entry. The consent will be in the form of a signed statement by the owner of record or his authorized agent which, at a minimum, includes a legal description of the land to be entered, the projected nature of work to be performed on the lands and any special conditions for entry. The statement may not include any commitment by the Department to perform reclamation work nor to compensate the owner for entry.

If the owner of the land to be entered for purpose of study or exploration will not provide consent to entry, the Department may give notice in writing to the owner of its intent to enter for purposes of study and exploration to determine the existance of adverse effects of past coal mining practices which may be harmful to the public health, safety, or general welfare. The notice may be by mail, return receipt requested, to the owner, if known, and will include a statement of the reasons why entry is believed necessary. If the owner is not known, or the current mailing address of the owner is not known, or the owner is not readily available, the notice will be posted in one or more places on the property to be entered where it is readily visible to the public and advertised once in a newspaper of general circulation in the locality in which the land is located. Notice will be given at least 30 days before entry.

The Department will give notice of its intent to enter for purposes of conducting reclamation at least 30 days before entry upon the property. The notice will be given in writing and will be mailed, return receipt requested, to the owner, if known, with a copy of the findings required by 82-4-239(4) MCA, (Figure 2). If the owner is not known, notice will be posted in one or more places on the property to be entered where it is readily visible to the public and advertised once in a newspaper of general circulation in the locality in which the land is located. The notice posted on the property and advertised in the newspaper will include a statement of where the findings required by this rule may be inspected or obtained.

Figure 2--82-4-239(4) MCA

If the Department makes a finding of fact that:

(a) land or water resources have been adversely affected by past coal mining practices; and

(b) the adverse effects are at a stage where in the public interest action to restore, reclaim, abate, control, or prevent should be taken; and

(c) the owners of the land or water resources where entry must be made to restore, reclaim, abate, control, or prevent the adverse effects of past coal mining practices are not known or readily available or the owners will not give permission for the Department or its agents, employees, or contractors to enter upon such property to restore, reclaim, abate, control, or prevent the adverse effects of past coal mining practices; then agents, employees, or contractors of the Department, after giving notice by mail to the owner, if known, or, if not known, by posting notice upon the premises and advertising in a newspaper of general circulation in the county in which the land lies, may enter upon property necessary or expedient to restore, reclaim, abate, control, or prevent the adverse effects of past coal mining practices. This act is not an act of condemnation of property or of trespass but rather an exercise of the power granted by sections 1 and 2, Article IX of the Montana Constitution.

Hard Rock and Opencut

The Department must obtain written permission from the owner of record of the land or property to be entered in advance of such entry.

Section 884.13(c)(7) Public Participation

Public hearings were held in the following cities:

Great Falls on February 13, 1980
Billings on February 14, 1980
Helena, on February 19, 1980
Plentywood on February 20, 1980
Miles City on February 21, 1980

Notices of public hearings were placed two weeks prior to the hearings in 4 major newspapers and the county or local newspaper where AML sites occur. These newspapers were:

Billings Gazette
Boulder Monitor
Carbon County News
Culbertson Searchlight
Fairview News
Forsyth Independent
Glendive Ranger-Review
Great Falls Tribune
Havre News
Helena Independent Record
Lewistown News-Argus
Livingston Enterprise
Miles City Star
Montana Standard (Butte)
Plentywood Herald
Powder River Examiner (Broadus)
Record-Tribune (Roundup)
Scobey Leader
Sidney Herald
Wolf Point Herald-News

An example of this notice follows:

NOTICE OF PUBLIC HEARING

A public meeting on the Montana Abandoned Mine Land Reclamation Plan of the Department of State Lands, Reclamation Division will be conducted in the following cities:

Great Falls, February 13, 1980
Time: 7:00 P.M.
Place: Commissioner Chambers, Rm. 200 Civic Center,
Park Drive and Central Avenue

Billings, February 14, 1980
Time 7:00 P.M.
Place: Room 3043, Federal Building, 315 North 26th Street

Helena, February 19, 1980
Time: 7:00 P.M.
Place: House Chambers, 3rd Floor Capitol Building

Plentywood, February 20, 1980
Time: 7:00 P.M.
Place: Montana National Bank of Plentywood, 220 North Main

Miles City, February 21, 1980
Time: 7:00 P.M.
Place: Main Building, Rm. 106 -- Miles City Community College
2715 Dickenson

Copies of the summary of the Montana Abandoned Mine Land Reclamation Plan will be available after February 4, 1980 from the Department of State Lands, Abandoned Mine Land Reclamation Program, Capitol Station, Helena, Montana 59601, phone 449-4560.

A news release was sent to the following newspapers and press offices as a follow-up to the Notice of Public Hearing:

Great Falls Tribune
Lee Newspapers - Independent Record (Helena)
Miles City Star
Missoulian
News Bureau, Capitol Station (Helena)
The Associated Press (Helena)
United Press International (Helena)

A copy of the news release is included in the following two pages.

There was a thirty day comment period following each hearing. Record of comments can be seen in the public involvement section (pages 46-49).

The taped transcripts of the meetings are available for inspection at the Department of State Lands, Abandoned Mine Lands Program, 1625 11th Ave., Helena, MT 59601.

All AML projects will be developed under Public Participation Act, M.E.P.A., open meetings law contained in figures 28 and 29 on page 166 and 167.

DEPARTMENT OF STATE LANDS

THOMAS L. JUDGE, GOVERNOR

CAPITOL STATION

STATE OF MONTANA

(406) 449-2074
RECLAMATION DIV.
(406) 449-4560

LEO BERRY, COMMISSIONER

1625 ELEVENTH AVENUE
HELENA, MONTANA 59601

NEWS RELEASE

FOR IMMEDIATE RELEASE

February 7, 1980
Contact: Dick Juntunen or
Brace Hayden
(449-4560)

Public Information Meetings Planned on the Montana Abandoned Mine Land Reclamation Program

State Lands Commissioner Leo Berry, Jr. today announced the times and locations for public meetings to discuss Montana's Abandoned Mine Land Reclamation Program. Montana's program is being prepared in accordance with the Federal Surface Mining Control Act of 1977 and when completed will be submitted to the Department of Interior's Office of Surface Mining for approval.

The Department of State Lands' Reclamation Division is presently inventorying abandoned coal and hard rock mining sites throughout Montana. Approximately 270 abandoned coal sites and 125 abandoned hard rock sites have been inventoried to date and the inventory will continue during the 1980 field season. Sites have been identified in forty-three of Montana's fifty-six counties.

Before final approval of Montana's program the Department of State Lands will initiate several Abandoned Mine Land (AML) reclamation projects through cooperative agreements with the Office of Surface Mining. Under one of the agreements, the Sand Coulee drainage south of Great Falls is slated for work this field season. Work in this area will be preparatory to actual reclamation projects and will involve a multi-disciplinary look at the problems in the area to develop a plan and time table of reclamation.

-30-

Meeting Schedule

Great Falls, February 13, 1980
Time: 7:00 p.m.
Place: Commissioner Chambers, Rm. 200 Civic Center,
Park Drive and Central Ave.

Billings, February 14, 1980
Time: 7:00 p.m.
Place: Room 3043, Federal Building, 315 N. 26th St.

Helena, February 19, 1980
Time: 7:00 p.m.
Place: House Chambers, 3rd Floor Capitol Building

Plentywood, February 20, 1980
Time: 7:00 p.m.
Place: Montana National Bank of Plentywood, 220 North Main

Miles City, February 21, 1980
Time: 7:00 p.m.
Place: Main Building, Rm. 106, Miles City Community College
2715 Dickenson

A summary of the work completed to date on Montana's AML program is available from the Department of State Lands, Capitol Station, Helena, Montana 59601.

-END-

Administrative & Management Structure

Section 884.13(d)(1) Department of State Lands Structural Organization

A structural organization chart indicating the lines of authority within the Department of State Lands is shown in Figure 3. Authority generally flows from staff members to Bureau Chief to Division Administrator.

The State Board of Land Commissioners (Board) consists of the Governor, the Attorney General, Superintendent of Public Instruction, State Auditor, and Secretary of State. The Department of State Lands (DSL) acts under the direction of the Board and administers the laws charged to the Board. The State Lands' Commissioner is the Chief Administrative Officer of the Department. The Board of Land Commissioners delegated all of its permitting and enforcement authority with regards to Montana's mined land reclamation statutues to the Commissioner of State Lands. The Commissioner is appointed by and serves at the pleasure of the Governor.

DSL has two primary duties; one is the management of state-owned lands, the second is administration of state and federal mined land reclamation statutes. In accordance with such duties, the Department is organized into a Land Administration Division, a Reclamation Division and a Centralized Services Division. The Department of State Lands was appointed by the Governor as the state regulatory authority to implement P.L. 95-87.

DSL's Land Administration Division oversees the leasing, sale, exchange, improvements, and overall management of state-owned lands.

DSL's Centralized Services Division handles the processing of lease and royalty payments on state lands. It is also responsible of such Departmental business as accounting, budgeting, and the processing of employee pay and benefits. The Centralized Services Division administers OSM grant monies for the Reclamation Division and assists the Reclamation Division in budgeting.

The Reclamation Division of DSL administers Montana's mined land reclamation statutes including the Montana Strip and Underground Mine Reclamation Act (coal and uranium), the Montana Strip and Underground Mine Siting Act (coal and uranium), the Montana Opencut Mining Act (sand, gravel, scoria, bentonite, clay, and phosphate) and the Montana Hard Rock Mining Act.

In addition to the three divisions, the Commissioner, State Lands Department, has a special staff that currently includes an administrative officer IV , and administrative officer in charge of environmental assessments, 4 environmental planners, two attorneys, an administrative aide, and a clerk typist.

The Reclamation Division has administered the initial regulatory program of P.L. 95-87 since February 3, 1978, and is responsible for administering the permanent regulatory program. The Reclamation Division is also responsible for carrying out the provisions of a Cooperative Agreement with the Department of Interior to regulate surface coal mining operations on Federal lands.

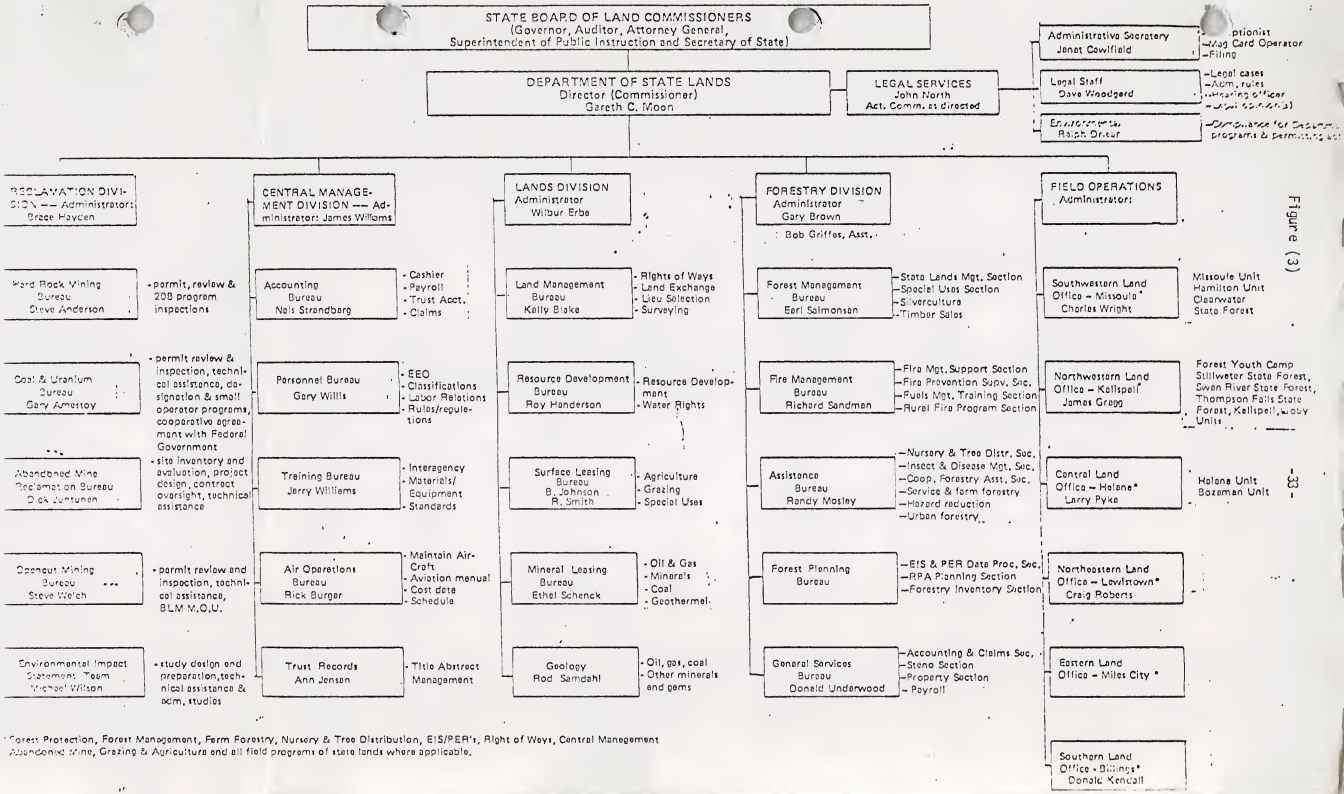

Figure (3)

*Forest Protection, Forest Management, Farm Forestry, Nursery & Tree Distribution, EIS/PER's, Right of Ways, Central Management Abandoned Mine, Grazing & Agriculture and all field programs of state lands where applicable.

This agreement was signed by the Governor of Montana, the Commissioner of State Lands and the Secretary of the Interior on October 18, 1978. The Reclamation Division is also responsible for developing and administering Montana's Abandoned Mine Land Reclamation Program (AML).

The Department of State Lands is composed of two divisions; Reclamation and Land Administration. Between these two divisions there is expertise in a multitude of various fields such as vegetation, hydrology, geology, mining engineering, cartography, water rights, soils, fisheries and wildlife, air and water quality, engineering, etc. This multi-disciphary staff is available to the AML program on an 'as available' basis and have assisted with the AML program to date.

As the need arises for more manpower or expertise, contractors will be hired to fill any short term gaps. If the need for more full time employees persists that full time position will be added as necessary.

The Abandoned Mine Reclamation Bureau (AMRB) presently has a Bureau Chief and two Reclamation Specialists on full time staff.

With the change of administration in Montana during 1980 a major change came about at the Montana Department of State Lands. The State Division of Forestry moved from the Department of Natural Resources to the Department of State Lands (see Figure 3).

The Forestry Division has a well developed statewide regional office system (see Figure 10A). The Montana Abandoned Mine Reclamation Bureau (AMRB) has taken full advantage of this regional system. The project inspectors hired by the AMRB to monitor reclamation construction will work out of the regional office closest to the project site. This method will allow the AMR Bureau to work quickly and more efficiently.

884.13(d)(2) Personnel Staffing Policies

The Montana Department of State Lands operates under the guidelines of the 'Affirmative Action Plan' for the State of Montana. Figure 4 is the Executive Order directing the Department of Administration to implement and maintain an Equal Opportunity Affirmative Action Plan' which is designed to further the provisions of equal employment opportunity. In addition, the DSL follows the guidelines of Montana's Affirmative Action Guidelines for the Handicapped.

The 'Department of State Lands Support - Affirmative Action Policy Statement' and the introduction to the "Affirmative Action Guidelines for the Handicapped" are included in Figures 5 and 6.

Figure 4 - Governor's Letter Authorizing the operation of the State of Montana's Affirmative Action Plan.

STATE OF MONTANA

Office of the Governor

EXECUTIVE ORDER 8-73

Executive Order directing the Department of Administration to implement and maintain an Equal Opportunity Employment Program in State government.

I, THOMAS L. JUDGE, Governor of the State of Montana, pursuant to the authority invested in me, hereby direct the Department of Administration to design, implement, and maintain an Equal Opportunity Employment Program in state government for all citizens of Montana without regard to race, religion, national origin, sex, or physical condition, except where sex or physical condition constitute a bonafide occupational requirement. The Department of Administration shall issue such regulations, standards, and other guidance as may be necessary for the implementation of an effective statewide affirmative action plan. This state plan shall be designed to eliminate discrimination in personnel policies and procedures, job structuring, position classifying, hiring, firing, promoting and training of state employees.

The Department of Administration shall monitor and maintain the Equal Employment Opportunity Program and submit a report thereon to the Governor within 90 days of the end of each year.

Given under my hand and the GREAT SEAL of the State of Montana this 28th day of November; in the year of our LORD, One Thousand, Nine Hundred Seventy-three.

THOMAS L. JUDGE, Governor

ATTEST:

Secretary of State

Figure 5 –

DEPARTMENT OF STATE LANDS SUPPORT -

AFFIRMATIVE ACTION POLICY STATEMENT

The Department of State Lands hereby accepts as its operating policy, the following statement which is designed to further the provision of equal employment opportunity to all members of the "affected class" and to promote the full realization of equal employment opportunity through a positive and continuing program:

> "It is the policy of the Department of State Lands to insure that employees during employment and all applicants for employment are treated equally without regard to their race, color, religion, national origin, age, marital status, ancestry, receipt of public assistance, political beliefs, physical or mental handicap, ex-offender status, or sex; unless sex, ex-offender status, and/or physical or mental handicap relates to a bona fide occupational requirement. Equal opportunity shall pertain to: employment, promotion, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship and/or on-the-job training. The Department shall put forth a good faith effort to equitably utilize the "affected class" work force potential".

The Department will expect all supervisors and employees to work actively to promote affirmative action and to achieve equal employment opportunity.

DATED: August 9, 1976

ILO BERRY, Acting Commissioner
Department of State Lands

Figure 6 - Introduction to the Affirmative Guidelines for the Handicapped.

The Rehabilitation Act of 1973 is the first Federal Civil Rights law protecting the rights of handicapped persons.

Section 503 of the Act requires government contractors and subcontractors to take affirmative action to employ and advance in employment qualified handicapped individuals.

The U.S. Department of Labor which is responsible for enforcement, issued regulations for implementation in June of 1974, and amended them in 1976 and 1977. These regulations apply to those departments which are federal contractors or subcontractors who have contracts or subcontracts in excess of $2,500.

Section 504 of the Act provides that "no otherwise qualified handicapped individual in the United States shall solely by reason of his handicap, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance."

In April of 1977 the Department of Health, Education and Welfare (H.E.W.), which is responsible for coordinating Section 504 enforcement, signed regulations effective June 3, 1977. These regulations apply to State departments who are recipients of federal funds. Although H.E.W. regulations apply to recipients of H.E.W. funds, these regulations will serve as the model for 504 regulations to be issued by other federal agencies. Consequently, all State departments receiving federal assistance from any source will be required to comply with substantially the same regulations.

In addition to the above federal requirements, all State departments are also covered by the Montana Code of Fair Practices which specifies that "all state and local governmental agencies shall promulgate written directives to carry out this policy* and to guarantee equal employment opportunities at all levels of state government," by the Governor's Executive Order 8-73 requiring a State Equal Opportunity Employment Program, and by Section 77-501, Revised Codes of Montana, requiring preference for disabled veterans and disabled civilians recommended by the Rehabilitation Services Division of the Department of Social and Rehabilitation Services.

The following guidelines are as nearly as possible consistant with both sets of federal guidelines, the Montana Code of Fair Practices, the Governor's Executive Order and Section 77-501. Departments covered by Sections 503 and 504 will be subject to some additional specialized requirements.

* That "state and local government officials and supervisory personnel shall recruit, appoint, assign, train, evaluate and promote personnel on the basis of merit and qualifications without regard to race, color, religious creed, political ideas, sex, age, marital status, physical or mental handicap, national origin, or ancestry."

Section 884.13(d)(3) Purchasing and Procurement

The Montana Department of State Lands (Department) follows the purchasing and procurement policies of the Purchasing Division of the Montana Department of Administration. These policies comply with the requirements of OMB Circular No. A-102, Attachment O. Figure 7 explains the purpose, policy, and objectives of the Purchasing Division's purchasing procedures.

The Department will assure that all procurement transactions will be conducted in a manner which will provide maximum open and free competition. In addition, contracts will be made only with responsible contractors who have the ability to perform the contract. Contracts will be administered by assigned employees of the Montana Abandoned Mine Land staff to assure contractor conformance with terms, conditions, and specifications of the contract, and to assure adequate and timely follow-up of all procedures.

Figures 8 and 9 explain the bidder requirements and bid procedures followed by the state. Generally, only those people who are on the bid list receive notice for bids of an amount less than $10,000. Bids under $25,000 are advertised for two consecutive weeks in the major state newspapers and those people on the bid list are notified. Bids of $25,000 or more require advertising for at least three consecutive weeks in two newspapers published in the state, one of which must be published in Helena and the other published in the county where the work is to be done; those people on the bid list are also notified.

All proposed procurement transactions will be reviewed by the Commissioner of the Department to avoid purchasing unnecessary or duplicative items or services.

Employees of the Department are subject to Rules 26.4.1346-26.4.1254, Administrative Rules of Montana. These rules discuss the restrictions on employee financial interest and have been implemented in accordance with 30 CFR Part 705.

The Department is subject to the "Montana Small Business and Purchasing Act". The purpose of the act is to insure that a fair proportion of state government's total purchases and contracts for property and services are placed with small business concerns.

Figure 7 - Montana's Department of Administration's Purchasing Procedures.

STATE OF MONTANA PURCHASING PROCEDURE

AUTHORIZATION

Title 18, Chapter 1, Sections 18-4-101 through 18-7-205, MCA 1978, contain the basic law charging the Department of Administration to control all State purchasing for all State departments.

PURPOSE

By concentrating all purchases in one organization it is possible to achieve standardization, elimination of duplication of effort, and lower prices as a result of volume buying. The Purchasing Division is staffed with people specially skilled in, and devoting their full time to, the business of purchasing. Agencies, vendors and the general public may thus look to one staff for information and assurance that the State's purchases are being handled properly and economically.

The Purchasing Division may be of assistance to State agencies in all matters relating to pre-requisition investigation of possible sources of supply, alternate product possibilities, specification preparation, product receipt practices, order follow-up and the enforcement of the terms and conditions relating to purchase orders issued by this division.

POLICY

It is the policy, as set by law for the Purchasing Division of the Department of Administration, to either purchase or direct and supervise the purchase

and sale of all supplies, equipment and services of whatever nature necessary for the proper transaction of the business of every State agency, institution, or official. (History: Title 18, Chapter 4, Section 18-4-101, MCA, 1978)

The Purchasing Division sets guidelines and purchasing practices for all State departments. These guidelines must be followed to insure that the Purchasing Division can provide its service to the agency, the vendor, and the State taxpayer as charged by law.

No State officer or employee will personally derive any benefit from use of facilities available to the State for the purchase of supplies, equipment and services. Use of State purchasing procedures to obtain property for personal use, or misrepresentations to vendors that personal purchases are for the State, for the purpose of obtaining a price discount not allowed on personal purchases, will expose officers or employees to prosecution under Penal Code relating to embezzlement and theft.

In accordance with the above policy, the following objectives are set forth:

OBJECTIVES

1. Buy the right merchandise of the proper quality and quantity at the right time and price from the proper source.

2. Conserve public funds through competitive bidding and purchasing the best possible quality merchandise available.

3. Improve the purchasing process by reducing the paper work and administrative costs.

4. Promote standardization and quality in merchandise ordered in order to secure better prices and better materials.

5. Improve the supply and speed of delivery of merchandise ordered.

6. Promote fair and open competition among vendors.

7. Promote an opportunity for all bidders to compete for State business on an equal basis.

8. Obtain a clear-cut line of communication between State agencies and the Purchasing Division.

Figure 8 - Bidder Requirements

BIDDER REQUIREMENTS

The State Purchasing Division maintains a list of the bidders to whom it regularly sends invitations to bid in the various categories of merchandise.

Once placed on the bid list, bidders automatically receive invitations to bid until removed from the list for some justifiable cause.

Any bidder desiring to be placed on this list may submit his written request to the Purchasing Division advising them of the commodities he desires to sell to the State.

The bidder will then be forwarded a Report and Affidavit of Bidder on State Contracts and Montana Small Business Purchasing Act form.

(Figure 8 continued)

Upon return of the completed form it will be determined, from the information furnished, whether the bidder is eligible for a three percent (3%) in-state bidder's preference, and for the Montana Small Business Purchasing Act.

Any person, firm or corporation not responding to two (2) consecutive invitations to bid may be removed from the bid list unless they return the bid form noting their inability to bid at that time.

Figure 9 - Bid Procedure

BID PROCEDURE

Invitation - Request for Quotations will be issued by the Department or Purchasing Division and provide adequate information and sufficient time to invite the highest degree of competition. Whenever possible, specifications or brand names will be used to establish a standard of quality, performance and/or use desired.

Information copies of the Request for Quotation are forwarded to the requesting agency for their review. The Purchasing Division is to be advised immediately of any omissions or errors that may be detected.

Quotation - No quotation will be considered unless it follows the form of the proposal and no changes will be considered in this bid form unless an Addendum is furnished each bidder by the Purchasing Division.

All bids must be complete, showing brand name or model of the item bidder proposes to furnish, unit price for each item, unless specific provision is made in the bid form for an optional figure, total extension prices for the quantity requested, signed by an authorized representative and returned to the Purchasing Division or Department by the specified time.

Public Opening - All bids received shall be opened publicly and read aloud at the time and place established in the invitation to bid.

Evaluation and Award - "Item by item" bids will receive primary consideration for award and "all or none" bids may be submitted as alternatives with consideration given if clearly in the best interest of the State.

The Purchasing Division or Department will award contracts, from proposals submitted, to the lowest responsible bidder who is a resident of the State of Montana and whose bid is not more than three percent (3%) higher than that of the lowest responsible bidder who is a non-resident of the State, and whose bid meets or exceeds the specifications of items requested.

(Figure 9 continued)

In awarding contracts for the purchase of products, materials, supplies or equipment, the Purchasing Division or Department shall award to any resident whose products are manufactured or produced in the State by Montana industry and labor and whose bid is not more than three percent (3%) higher than that of the lowest responsible resident bidder whose offered products are not so manufactured or produced, provided they are comparable in quality and performance.

In awarding contracts the Department shall meet the requirements of OMB - Circulor A-102 attachment (O), concerning contracting with small and minority firms, Womens' Business Enterprises and labor surplus area firms.

Section 884.13(d)(4) Accounting

The Montana Department of State Lands (Department) utilizes the Statewide Budgeting and Accounting System which conforms to the requirements of OMB Circular No. A-102. Key principles of this system are summarized in the following paragraphs.

The Department will safeguard all funds, property, and assets in the reclamation program and assure they will be used solely for authorized purposes.

An accounting of actual money spent compared to budgeted amount will be prepared for each grant.

Arrangements are being made so that when advances are made by a letter-of-credit method, the Department will make drawdowns from the U.S. Treasury through its commercial bank as closely as possible to the time of making disbursements.

Legislative auditors will audit the Department at least once every two years, pursuant to the requirements of OMB Circular No. A-102. The audit will be performed in accordance with 'Standards for Audit of Governmental Organizations, Program Activities, and Functions'.

Findings of audits will be resolved in a timely fashion through a review conducted by the Commissioner of the Department. The Commissioner will send, in writing, any recommendations which the Commissioner may deem necessary to the Regional Director of OSM. These recommendations will be sent 30 days after receipt of the findings of the audit. Upon approval of the Regional Director of OSM, the Commissioner of the Department will implement the recommendations.

The accounting system to be utilized by the Department for the State Abandoned Mine Reclamation Fund will provide for a separate accounting for each source of funding identified in 30 CFR 872.12: 1) grants from OSM under 30 CFR Part 885, 2) user charges collected by the State under 30 CFR Part 879, 3) monies recovered by the State through satisfaction of liens under 30 CFR Part 882, 4) monies recovered by the State from the sale of land under 30 CFR Part 879, and 5) such monies as the State decides to deposit in the State Abandoned Mine Reclamation Fund.

Section 884.13(e) Record of Public Participation

Chronology of Public Meetings

Location	Date
1. Great Falls, Montana, Cascade County	Feb. 13, 1980
2. Billings, Montana, Yellowstone County	Feb. 14, 1980
3. Helena, Montana, Lewis & Clark County	Feb. 19, 1980
4. Plentywood, Montana, Sheridan County	Feb. 20, 1980
5. Miles City, Montana, Custer County	Feb. 21, 1980

Record of Public Meetings

Meeting #1 -- Great Falls, Montana

Attendance:

Brace Hayden, Helena, Montana (Department of State Lands)
Dick Juntunen, Jefferson City, Montana (AML)
Mark Carlstrom, Helena, Montana (AML)
Ben Mundie, Helena, Montana (AML)
Vick Kunesh, Great Falls, Montana
Paul Rasmussen, Great Falls, Montana
Paul Ekness, Great Falls, Montana
Donna Wahlberg, Great Falls, Montana

Dick Juntunen presented a prepared statement summarizing Montana's proposed Abandoned Mine Land Reclamation Program after which those present were encouraged to participate by means of questions or comments pertaining to the program, eligible impacted lands and water, or the enactment of the program.

Analysis of Comments

Paul Ekness asked a question pertaining to the mining of bentonite in north central Montana. Brace Hayden from the Department of State Lands explained that the Opencut Bureau of the Department of State Lands had jurisdiction in the permitting of bentonite mining and oversees the reclamation of current mining activities.

No further questions or comments were received.

Meeting #2 -- Billings, Montana

Attendance:

Dick Juntunen, Jefferson City (AML)
Ben Mundie, Helena, Montana (AML)
Mark Carlstrom, Helena, Montana (AML)
Rex McCann, Billings, Montana
Bart Richards, Nye, Montana (Anaconda Copper Co.)
John Small, Crow Agency, (Crow Reservation - AML)

Dick Juntunen presented a prepared statement summarizing Montana's proposed Abandoned Mine Land Reclamation Program after which those present were encouraged to participate by means of questions or comments pertaining to the program, eligible impacted lands and water, or the enactment of the program.

Analysis of Comments

Rex McCann of Roundup, Montana commented that he owns land in the Bull Mountain coal field and that he is interested in reprocessing the coal refuse piles and removing the deteriorating mine buildings, from an abandoned mine on his property.

In response, Mr. McCann was told that either the Montana Bureau of Mines and Geology or the Department of State Lands Coal Bureau may have information concerning the reprocessing of coal refuse piles. Mr. McCann was also informed that with the landowner's cooperation, abandoned mine sites that have been determined to be of a high priority may be reclaimed with Abandoned Mine Land funds.

The mine Mr. McCann spoke of, Johnnies Coal Mine, located in Section 15, Township 7 North, Range 26 East, was added to the Montana Abandoned Mine Land inventory, and will be visited during the 1980 field season.

John Small, from the Crow Reservation AML Program, had questions concerning the time interval between the completion of inventory and the receiving of funds for reclamation projects, and concerning the agencies and individuals contacted by the Department of State Lands in conducting our preliminary inventory.

In response, Mr. Small was informed that any AML site where public health and safety are threatened and an emergency condition exists, funds for reclamation are available from the Office of Surface Mining. Mr. Small was also provided with a listing of the Federal and State agencies contacted by the Department of State Lands in compiling our AML inventory.

Bart Richards, of the Anaconda Copper Company, asked if a listing of AML sites ranked by priority was available. In particular, Mr. Richards was interested in the location of Anaconda's AML sites on the priority list.

In response, it was explained to Mr. Richards that due to an incomplete field inventory, currently being conducted by the Department of State Lands, the ranking of AML sites by priority is not yet complete. It was also noted that a ranking of AML sites by priority need not be final. New problem sites are expected to be found and will be included in the priority list when they are verified.

Meeting #3 -- Helena, Montana

Attendance:

Brace Hayden, Helena, Montana (DSL)
Dick Juntunen, Jefferson City, Montana (AML)
Mark Carlstrom, Helena, Montana (AML)
Ben Mundie, Helena, Montana (AML)
George Fussell, Jefferson City, Montana
Gerald Lindstrom, Jefferson City, Montana
Charles Wood, Helena, Montana, Water Quality Bureau
John Westenbery, Helena, Montana
Larry Lovelace, Boulder, Montana
Roger Gordon, Butte, Montana
Gene Schmidt, Butte, Montana
Victor Kunesh, Great Falls, Montana
Tom Coster, Black Eagle
Jim Richard, Prickly Pear Sportman Association
Don Cromer, Elliston, Montana
Joe Armstrong, Helena, Montana

Dick Juntunen presented a prepared statement summarizing Montana's proposed Abandoned Mine Land Reclamation Program after which those present were encouraged to participate by means of questions or comments pertaining to the program, eligible lands and water, or the enactment of the program.

Analysis of Comments

Jim Richards of the Prickly Pear Sportman Association outlined the comprehensive clean-up program proposed for the Prickly Pear drainage by his organization. He stated that the acid mine drainage from inactive mines in the headwaters of the Prickly Pear Basin is not only the principle cause of water quality degradation but is also the problem where adequate funds and technology are lacking in his organization. Mr. Richards offered the support of his organization, local landowners, and two state legislators for an acid mine drainage abatement program in the Prickly Pear headwaters.

In response, it was explained to Mr. Richards that in Public Law 95-87, there is a provision for the implementation of non-coal projects prior to completion of all coal related reclamation, if a special request is made by the Governor. It was further explained that a threat to public health and safety need be proven for a non-coal project to receive the Governor's designation as a special request.

The difference between abandoned and inactive mines was also discussed to point out the legal problems faced by the Abandoned Mine Land Program in areas where the possibility of renewed mining activity exists.

Roger Gordon, from Butte, Montana had questions concerning the role of the property owner in the AML program, and whether or not further public participation would be accepted farther down the line.

In response to Mr. Gordon, it was explained that due to the large number of problem areas in Montana, only those where full landowner cooperation is received will be considered, and that further public comment is expected as individual reclamation projects get underway, with public hearings a possibility.

Larry Lovelace, from Boulder, Montana, commented on an inactive mine that was actively discharging acid mine drainage into the South Boulder River.

In response to Mr. Lovelace, it was explained that the Mammoth Mine, located in Section 18, Township 2 South, Range 3 West, is a patented claim and might not meet the requirements under the AML guidelines. The site was visited on February 20, 1980 for field verification and was added to the Montana AML inventory list for future consideration.

Gene Schmidt, a geologist from Butte, Montana, commented on the fact that old mine adits, shafts, and mine dumps are important sources of data for structural geology and mineralogical studies.

In response to Mr. Schmidt, it was explained that adequate closure of mine openings need not be permanent in nature. Sound portal coverings that would prevent accidental entry may be sufficient.

There were no unresolved controversies at the closing of this meeting.

Meeting #4 -- Plentywood, Montana

Attendance:

No show

Due to inclement weather, Dick Juntunen and Ben Mundie from the Montana AML Program were unable to attend the scheduled meeting in Plentywood. The proper individuals were contacted in Plentywood and were instructed to provide attendance sign-up sheets in the designated meeting room so that interested persons could be individually contacted by AML personnel. The lack of any signatures on the aforementioned attendance sheets prevented any further follow-up on public interest in the Plentywood area.

Meeting #5 -- Miles City, Montana

Attendance:

Dick Juntunen, Jefferson City, Montana (AML)
Ben Mundie, Helena, Montana (AML)

No public interest in the AML Program from the Miles City area was expressed.

There were no unresolved controversies at the closing of this meeting.

Appendix I Reclamation Project Evaluation

Coal*

26.4.1234 Abandoned Mine Land Reclamation: Reclamation Objectives and Priorities

Abandoned mine land reclamation projects shall meet one or more of the objectives stated in this subsection. The objectives are stated in the order of priority with the highest priority first. Preference among those projects competing for available resources shall be given to projects meeting higher of the following priority objectives:

(1) protection of public health, safety, general welfare and property from extreme danger resulting from the adverse effects of past coal mining practices;

(2) protection of public health, safety, and general welfare from adverse effects of past coal mining practices which do not constitute an extreme danger;

(3) restoration of eligible land and water and the environment previously degraded by adverse effects of past coal mining practices, including measures for the conservation and development of soil, water (excluding channelization), woodland, fish and wildlife, recreation resources, and agricultural productivity;

(4) research and demonstration projects relating to the development of strip or underground coal mining reclamation and water quality control program methods and techniques;

(5) protection, repair, replacement, construction, or enhancement of public facilities such as utilities, roads, recreation, and conservation facilities adversely affected by past coal mining practices;

(6) development of publicly owned land adversely affected by past coal mining practices, including land acquired under Rules 26.4.1237 through 26.4.1239 for recreation and historic purposes, conservation, and historic purposes, conservation and reclamation purposes and open space benefits;

(7) those priorities listed in Rules 26.4.124(2) through (4) and 26.4.224(2) through (4);

(8) construction of public facilities in communities impacted by coal development if the governor certifies that all other objectives of the fund have been met, the available impact funds are inadequate, and the board concurs. (History: Sec. 82-4-204, 205 MCA; IMP, Sec. 82-4-239 MCA; NEW, 1980 MAR p. 725, Eff. 4/1/80.)

Hard Rock*

26.4.124 Abandoned Mine Land Reclamation: Objectives and Priorities

Abandoned mine land reclamation projects shall meet one or more of the objectives stated in this subsection. The objectives are stated in the order of priority with the highest priority first. Preference among those projects competing for available resources shall be given to projects meeting the higher of the following priority objectives:

*Source: Administrative Rules of Montana 7/1/80

Hard Rock cont'd

(1) all those priorities listed in Rule 26.4 1234(1) through (6) have all been fulfilled;

(2) protection of the public from hazards endangering life and property resulting from the adverse effects of past metal (hard rock) or mining practices. However, upon the request of the governor, such work may be undertaken before the priorities listed in Rule 26.4.1234(1) through (6) have been fulfilled;

(3) protection of the public from hazards to health and safety from the adverse effects of past metal (hard rock) mining practices;

(4) restoration of the environment degraded by the adverse effects of past metal (hard rock) mining; and

(5) the priority listed in Rule 26.4.1234(8). (History: Sec. 82-4-321 MCA: IMP, Sec. 82-4-311 MCA; NEW, 1980 MAR p. 725, Eff. 4/1/80.)

Opencut*

26.4.224 Abandoned Mine Land Reclamation: Objectives and Priorities

Abandoned mine land reclamation projects shall meet one or more of the objectives stated in this subsection. The objectives are stated in the order of priority with the highest priority first. Preference among those projects competing for available resources shall be given to projects meeting the higher of the following priority objectives:

(1) all those priorities listed in Rule 26.4.1234(1) through (6) have all been fulfilled;

(2) protection of the public from hazards endangering life and property resulting from the adverse effects of past opencut mining or mining practices. However, upon the request of the governor, such work may be undertaken before the priorities listed in Rule 26.4.1234(1) through (6) have been fulfilled;

(3) protection of the public from hazards to health and safety from the adverse effects of past opencut mining practices;

(4) restoration of the environment degraded by the adverse effects of past opencut mining; and

(5) the priority listed in Rule 26.4.1234(8). (History: Sec. 82-4-422 MCA; IMP, Sec. 82-4-424 MCA; NEW, 1980 MAR p. 725, Eff. 4/1/80.)

*Source: Administrative Rules of Montana 7/1/80

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Proposed Affirmative Action Guidelines for the Handicapped. Helena, Montana: Montana Department of Administration, June, 1978.

Purchasing Procedures, Helena, Montana: Montana Department of Administration, January, 1980.

Part II

Parameters Relating to the Montana AML Reclamation Program

Introduction

This section presents a general discussion of the social, economic, and environmental parameters prevailing throughout the State. For clarity and convenience some discussions use the regional base shown in Figure 10. These regions consist of counties with similar geographic and socio-economic characteristics.

DEPT. OF STATE LANDS
ADMINISTRATIVE REGIONS

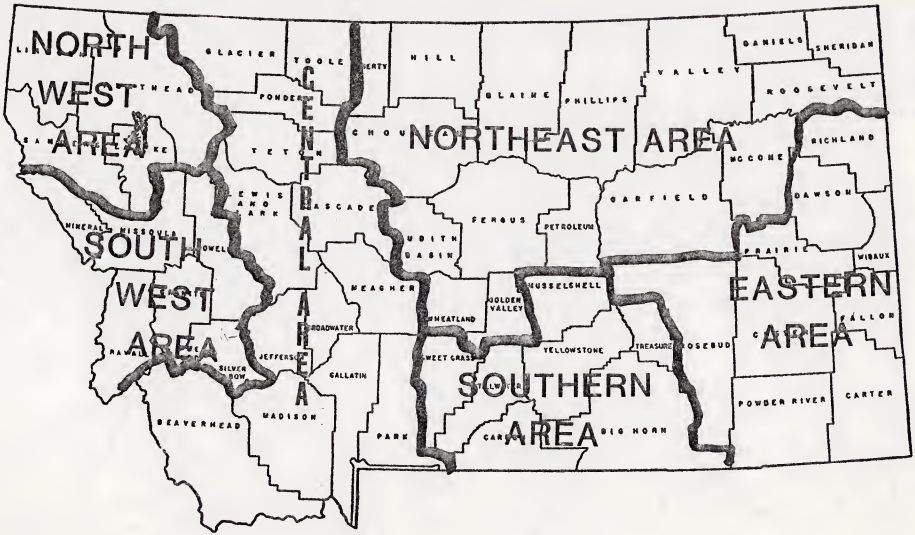


Figure (10)

Section 884.13(f)(5)(i) Social and Economic Characteristics of Montana

Education

The 1970 U.S. Census data on education achievement levels for Montana's population 25 years of age or older, show that the white median number of school years completed was 12.2 while that of the U.S. was 12.1. The median number of school years completed by the non-white population in the state, 25 years of age or older, was 11.9 while that of the U.S. was 9.6.

Montana's public elementary and secondary schools (kindergarten through Grade 12) has a total enrollment of 164, 326 students in 1978-79. Of this number 2,348 students are enrolled in the ungraded special education program. Current data regarding enrollment of private elementary and secondary schools is unavailable at present as the result of the recent defeat of House Bill 525 to amend Section 20-5-102 of the Montana Codes Annotated (M.C.C.A.). This bill was an act to require non-public schools to register the official name of the school and also the name of the principal. Failure of the passage of this bill has prevented the State of Montana from having a current listing of all schools in Montana and a complete enrollment figure of those students attending elementary and secondary schools.

The 1978-79 enrollment of students in Montana's junior colleges is 2,651 students while the total enrollment for the State University System is 25,100. In addition, 3,136 students are enrolled in private colleges. The ratio of first time resident students to high school graduates is 59%; this does not include those students going to out-of-state schools.

Information is not available for the number of students enrolled in Vocational Technical schools.

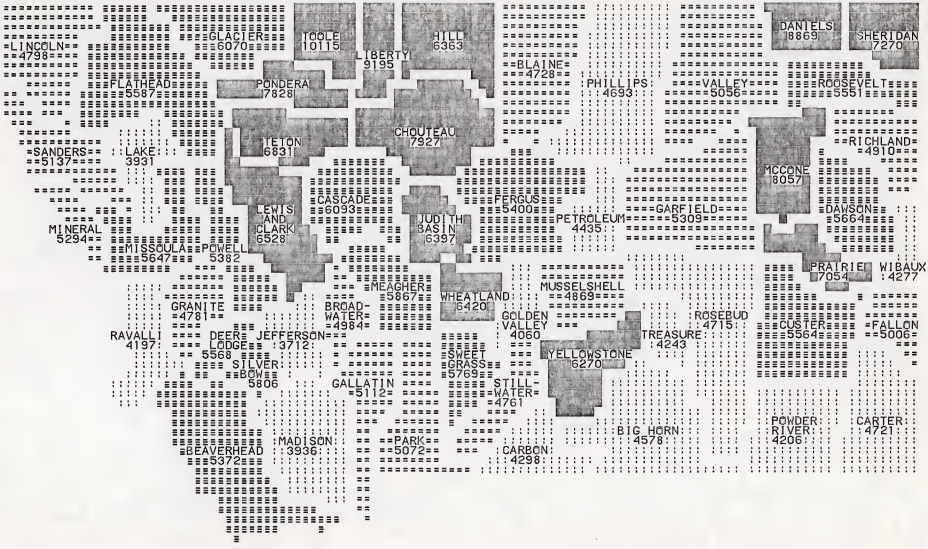
Housing

In Montana, there were 246,603 occupied housing units in 1970. Because the State does not have a building permit law for counties, projections for housing units to accommodate Montana's growing population are not available.

Income

In 1976, the total personal income for Montana residents was $4,284 billion. The per capita income in the state was $5,691 representing a 38 percent increase since 1970. Montana's per capita personal income ranks 34th in the nation. The per capita income shows the heaviest concentration of higher income levels in the North Central region along the high-line (see Figure 11). There are more families in Eastern Montana who have incomes below the poverty level even though the per capita income is above the state average in the region.

MAP 6.5.0 PER CAPITA INCOME: 1976



SOURCE: BUR. OF ECONOMIC ANALYSIS, U.S. DEPT. OF COMMERCE (REIS MAGNETIC TAPE)

::::	3712 -	4721	LOW QUARTILE
....	4728 -	5309	MEDIUM LOW QUARTILE
####	5372 -	6093	MEDIUM HIGH QUARTILE
@@@@	6270 -	10115	HIGH QUARTILE

MEAN VALUE: 5612
MEDIAN VALUE: 5341
STATE VALUE: 5691

Figure 11

Another significant income measure is the percentage of personal income remaining after federal, state and local taxes which is a bulk measurement of market potential. In 1977, Montana ranked 41st among the 50 states and the District of Columbia.

In 1970, 10.4 percent of all Montana families had incomes below the poverty level. Nationally the figure was 10.5 percent.

Economic Activity

Table 1 lists labor and proprietors' income in Montana by major industrial groupings for Montana's five AML regions. Services and wholesale and retail trade are the State's largest industries. Although Montana is considered a resource state, it is apparent that much income is service-oriented and this trend is expected to continue.

Employment

Montana's peak unemployment rate during the past eight years was 8.1 percent in January, 1977 to an estimated 6.0 percent in 1978. Figure 12 shows the three year average annual unemployment rate for Montana, 1975-77. As in the case with U.S. employment rates, the state shows teenagers and Indians to have significantly higher rates of unemployment.

Classification of industries for analytical use is divided into two sections: goods-producing, as the name implies, deals in producing goods for consumption and includes the major industry divisions of agriculture, mining, manufacturing, and contract construction. Service-producing industries include: wholesale and retail trade, services, government, transportation and public utilities, and finance, insurance and real estate.

Since Montana is perceived to be a highly rural state, it is erroneously assumed that the state is highly agrarian. Although agriculture remains Montana's largest export industry, employment opportunities exist in this industry through replacement needs rather than by expansion. Farm workers is the only major occupational group expected to decrease by 1985.

During 1974, white-collar workers - professional, technical, managers, officials, proprietors, clerical, and salesworkers - outnumbered blue collar workers - craftsmen, foremen, operations, and laborers - by 42,000 jobs. This gap is expected to increase to nearly 60,000 workers by 1985.

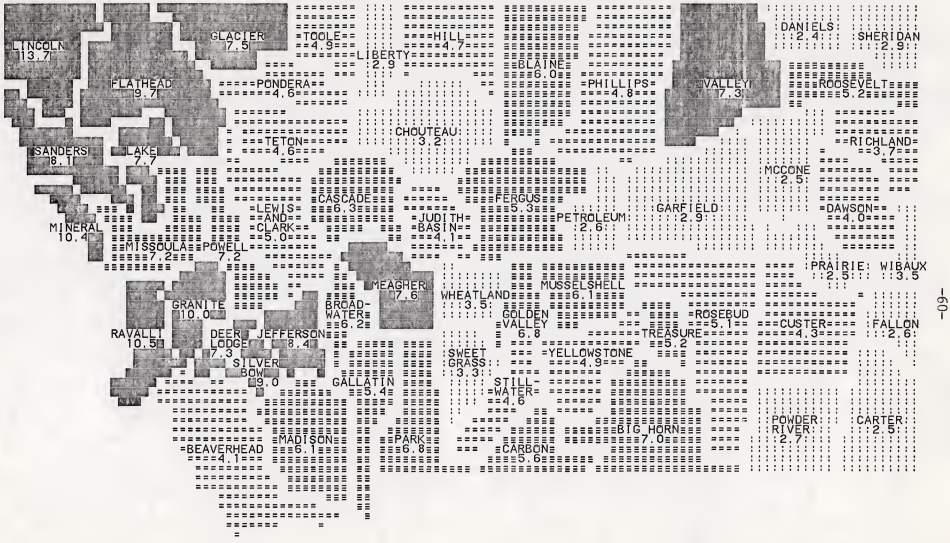
Among the most prominent of the state's occupations is services. This amounts to approximately 28 percent of the state's total work force. Wholesale and retail workers account for approximately 23 percent of the work force in Montana. Agriculture, forestry, and fisheries account for approximately 13 percent of employment (industry expansion during the period will be attributed to forestry and fisheries rather than to agriculture) while 9 percent is engaged in manufacturing. These four major industries account for approximately 73% of the state's employment rate during 1974.

Table 1 -- 1977 PERSONAL INCOME (Thousands of Dollars)

	Region 1	Region 2	Region 3	Region 4	Region 5
Total Labor and Proprietors Income By Place of Work					
By Type					
Wage and Salary Disbursements	298003	569753	608654	669168	633551
Other Labor Income	26075	41196	53442	59218	54015
Proprietors Income	63782	129312	79015	75723	74786
Farm	13835	54291	2331	8472	4024
Non-Farm	49947	75021	76684	67251	70762
By Industry					
Farm	32798	68335	14893	21846	8555
Non-Farm	355062	671926	726218	782263	753797
Private	274799	483559	598135	562083	593783
Ag. Serv., For., Fish., & Other	1489	1888	2446	947	1905
Mining	31525	22284	29277	2161	719
Construction	40079	65767	70278	51962	68616
Manufacturing	12417	36879	74295	81752	179467
Non-Durable Goods	8709	17452	54520	20577	22727
Durable Goods	3364	19387	19437	57151	156736
Transportation and Public Utilities	52655	64413	81095	76166	77629
Wholesale Trade	16144	48970	76776	32473	34071
Retail Trade	44150	88864	98862	100793	91216
Finance, Insurance & Real Estate	10707	37405	34648	35981	28314
Services	54394	102885	116918	89252	102418
Government and Government Enterprises	80263	188367	128083	220180	160014
Federal, Civilian	21050	41303	34414	44850	57959
Federal, Military	2890	62883	3164	3189	3783
State and Local	56323	84181	90505	172141	98272
Tot Labor & Prop Income by Place of Work	387860	740261	741111	804109	762352
Personal Income by Place of Residence	535955	970030	989626	1091509	1049677
Per Capita Personal Income (Dollars)	5394	6502	6477	6026	5878
Total Population	99346	149178	152781	181128	178577

Data From Bureau of Economic Analysis - Reis Tape
Aggregated to Regions by Montana Dept. of Community Affairs

MAP 5.2.0 THREE-YEAR AVERAGE ANNUAL UNEMPLOYMENT RATE: 1975 - 1977



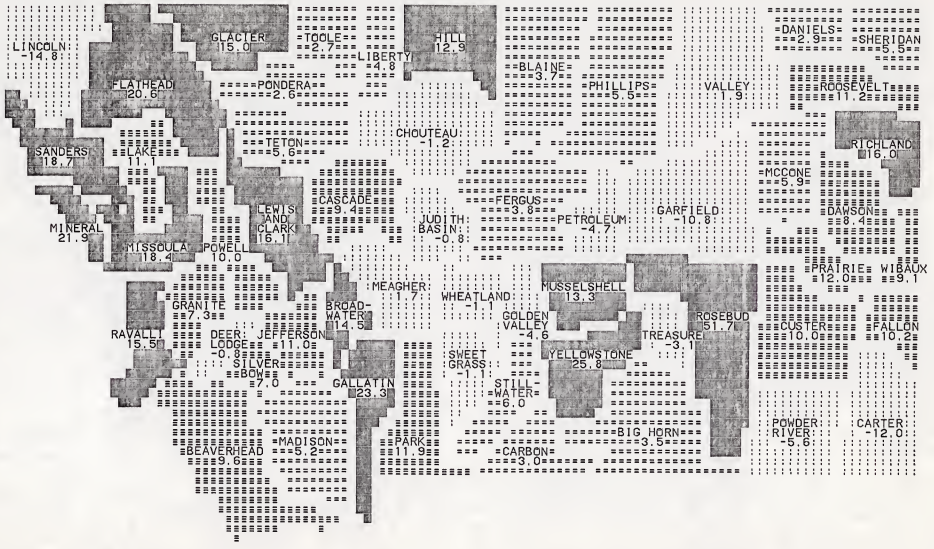
SOURCE: MONTANA DEPT OF LABOR
MONTANA EMPLOYMENT AND LABOR FORCE, V.8, NO.7, JULY 1978

::::	2.4 - 3.5	LOW QUARTILE
====	3.7 - 5.1	MEDIUM LOW QUARTILE
====	5.2 - 7.2	MEDIUM HIGH QUARTILE
	7.3 - 13.7	HIGH QUARTILE

MEAN VALUE: 5.6
MEDIAN VALUE: 5.1
STATE VALUE: 6.3

Figure 12

Figure 13 graphically displays Montana's total employment percent change from 1971 to 1976; Table 2 shows Montana's 1977 employment figures broken down by occupation and listed by AML region.



SOURCE: BUR OF ECONOMIC ANALYSIS,
U.S. DEPT OF COMMERCE
(REIS MAGNETIC TAPE)

::::	-14.8 -	1.9	LOW QUARTILE
::::	2.6 -	6.0	MEDIUM LOW QUARTILE
::::	7.0 -	12.0	MEDIUM HIGH QUARTILE
::::	12.9 -	51.7	HIGH QUARTILE

MEAN VALUE: 7.6
MEDIAN VALUE: 6.5
STATE VALUE: 12.9

Figure 13

Table 2 1977 EMPLOYMENT

	Region 1	Region 2	Region 3	Region 4	Region 5
Total Employment	44775	68753	72305	79611	74164
Number of Proprietors	11403	10043	11244	9340	10732
Farm Proprietors	7382	5221	4793	2899	3391
Non-Farm Proprietors	4021	4822	6451	6441	7341
Total Wage and Salary Employment	33372	58710	61061	70271	63432
Farm	2306	1950	1789	1769	681
Non-Farm	31066	56760	59272	68502	62746
Private	22299	38661	46242	46748	47718
Ag. Serv., For., Fish., and Other	202	236	304	108	213
Mining	1362	893	1047	162	51
Construction	1925	3316	3643	2855	3798
Manufacturing	1190	2370	4717	5492	11253
Non-Durable Goods	874	1217	3332	1566	1674
Durable Goods	300	1127	1358	3596	9570
Transportation and Public Utilities	2946	3614	4404	4283	4476
Wholesale Trade	1293	3504	5088	2142	2466
Retail Trade	5412	10367	11928	12278	11400
Finance, Insurance & Real Estate	825	2689	2655	2952	2242
Services	6137	10417	11270	10071	10888
Government and Government Enterprises	8767	18099	13030	21754	15028
Federal, Civilian	1393	3092	2346	2806	3469
Federal, Military	776	6217	1057	1270	1276
State and Local	6584	8790	9603	17678	10283

Data From Bureau of Economic Analysis - Reis Tape
Aggregated to Regions by Montana Dept. of Community Affairs

Section 884.13(f)(5)(ii) Demographic and Geographic Characteristics of Montana

Montana is a sparsely populated state located in the Rocky Mountain Region which in 1978 ranked 42nd in population nationally. The 1976 population was estimated at 761,000 residents while the 1980 population projection is 790,000. Figures 14 and 15 show a graphic profile of Montana's estimated population and population density. Since 1970, Montana's total population growth rate has averaged about 1.5 percent per year, compared with the U.S. average of around 1 percent. If Montana is examined with respect to its eastern plains vis-a-vis the western mountain regions, the eastern region appears to be growing at about the same rate as the Dakotas and Nebraska, while the mountainous regions are experiencing a growth rate similar to Colorado, western Wyoming, and southern Idaho. The projected growth rates for Montana and the United States may be found in Table 3. Montana's 0-4 year old age group is predicted to decrease from 12 to 7 percent of the total population from 1950-2000, which probably depicts a decrease in the birth rate. The 5-17 and 65 and over age groups remain stable during these years while there is an increase in the 18-64 year old age group which might mean an in-migration factor for the state.

Population changes for the state and the five AML regions for the period of 1970-78 can be seen in Table 4. This Table shows that Montana's population increased 13 percent from 1970-1978; the rate of population increase varied considerably by region. This regional variance reflects the varied fluctuations in county populations (Figure 16).

The state total for in-migration during the period 1960-1970 was 58,153 or 8.6 percent. The increase was basically noted into/around major Montana cities. It is expected that the percentage of those classified living in rural areas has decreased from 47 percent (1970).

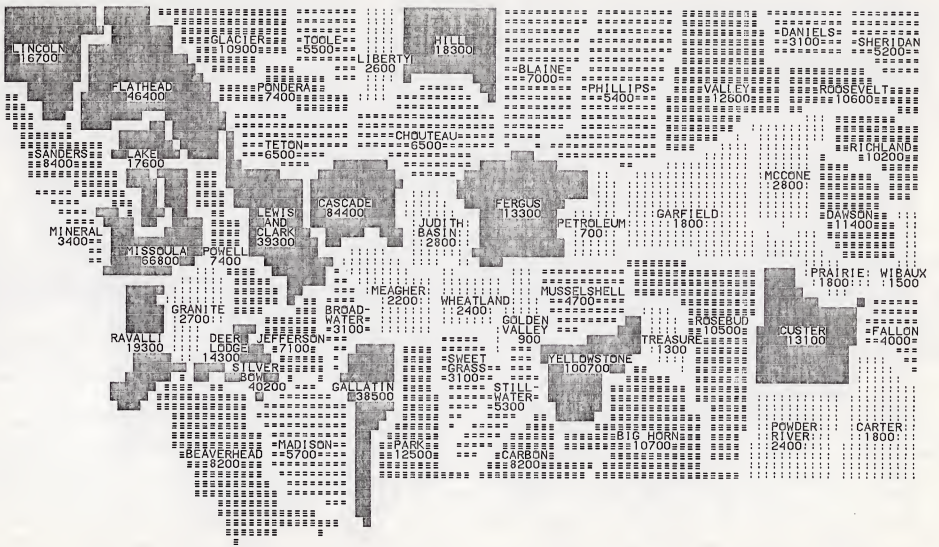
Table 3

PROJECTED GROWTH RATES
MONTANA AND THE U.S.

Decade	Montana Series			U.S. Series		
	High	Medium	Low	I	II	III
1970-80	20.6%	13.3%	2.8%	10.3%	9.3%	8.6%
1980-90	18.4%	16.7%	7.8%	13.7%	9.6%	7.0%
1990-2000	16.4%	16.4%	7.1%	11.0%	6.9%	4.0%

Source: Montana Department of Community Affairs, Montana Population Projections 1975-2000, August, 1977.

MAP 1.1.0 ESTIMATED POPULATION: 1977



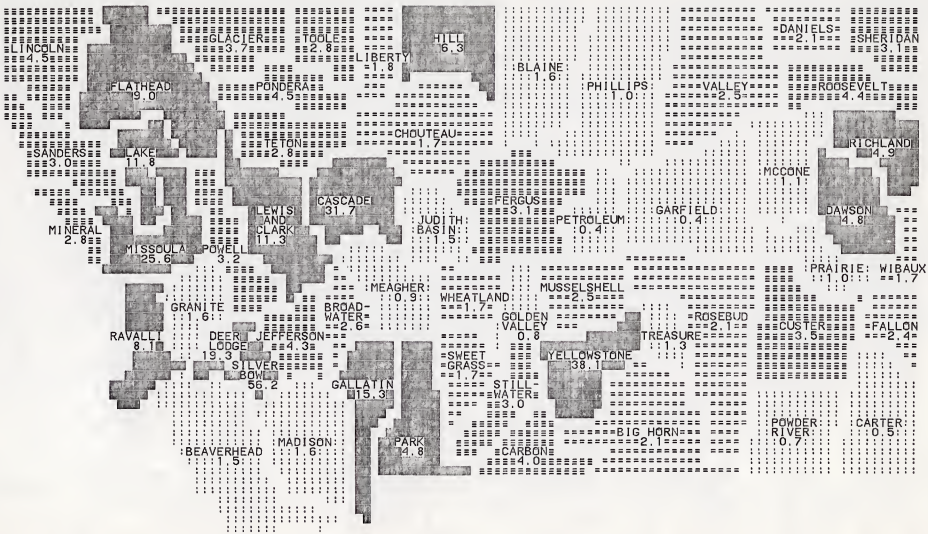
SOURCE: U.S. BUR OF THE CENSUS
CURRENT POPULATION REPORTS
SERIES P-26

::::	700 - 2800	LOW QUARTILE
====	3100 - 7000	MEDIUM LOW QUARTILE
####	7100 - 12600	MEDIUM HIGH QUARTILE
	13100 - 100700	HIGH QUARTILE

MEAN VALUE: 13593
MEDIAN VALUE: 7050
STATE VALUE: 761000

Figure 14

MAP 1.2.0 POPULATION DENSITY: 1977
(PERSONS PER SQUARE MILE OF LAND AREA)



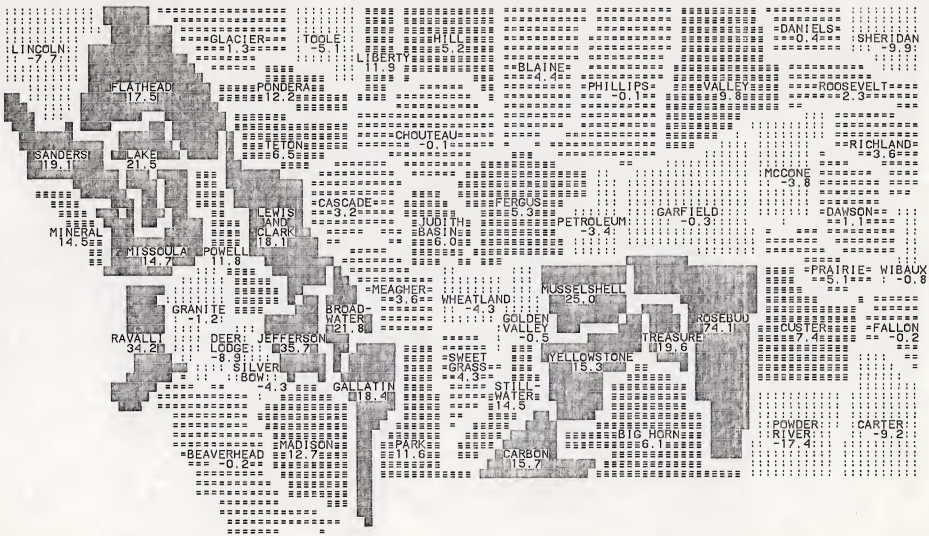
SOURCE: U.S. BUR OF THE CENSUS
CENSUS OF POPULATION: 1970
V.1, PT.28, MONTANA (IN PART)

::::	0.4 - 1.6	LOW QUARTILE
====	1.7 - 2.6	MEDIUM LOW QUARTILE
####	2.8 - 4.5	MEDIUM HIGH QUARTILE
[shaded]	4.8 - 56.2	HIGH QUARTILE

MEAN VALUE: 6.1
MEDIAN VALUE: 2.8
STATE VALUE: 5.2

Figure 15

MAP 1.3.0 PERCENT CHANGE IN POPULATION: 1970 TO 1977
(BASED ON UNROUNDED NUMBERS)



SOURCE: U.S. BUR OF THE CENSUS
CURRENT POPULATION REPORTS
SERIES P-26

	-17.4 -	-0.3	LOW QUARTILE
	-0.2 -	5.1	MEDIUM LOW QUARTILE
	5.2 -	14.5	MEDIUM HIGH QUARTILE
	14.7 -	74.1	HIGH QUARTILE

MEAN VALUE: 7.8
MEDIAN VALUE: 5.1
STATE VALUE: 9.6

Figure 16

Table 4

Montana's Population Changes 1970 to 1978

	1970	1978	Increase	Percent Increase
State	694,409	784,700	90,291	13.0%
Region 1	93,221	99,100	5,879	6.3%
2	144,070	153,100	9,030	6.3%
3	135,263	157,700	22,437	13.4%
4	167,164	186,300	19,136	11.4%
5	154,691	188,400	33,809	21.9%

Source: U.S. Bureau of the Census, Estimates of the Population of Montana Counties, August, 1979

The male/female ratio has shifted from an excess of males in 1960 to slightly more females in 1970. Montana has reflected the same general trend as the nation, but not to as great an extent, with only .9 percent differentiation between the male/female ratio. The median age of females increased from 27.1 years in 1960 to 27.6 years in 1970, while the median age of males decreased from 28.0 years in 1960 to 26.6 years in 1970 which is probably indicative of less out-migration of males looking for employment.

The largest minority group in Montana is the Native American. Statistics on the numbers and basic characteristics of the Indian population are available from many sources (Table 5). Because of their relatively high birth and death rates, the greatest percentage (44%) of the Indian population is under the age of fourteen and only 4.8% of the Indian population is over the age of 65. Conversely, the age distribution of the white population in Montana shows only 29% in the 0-14 age category and 10% in the over 65 category.

A distinguishing characteristic of Montana is evidenced by its size (ranking fourth in the nation) and by the diversity contained within the state of both its people and the natural environment. Montana covers 147,138 square miles with distances averaging 550 miles in length to 275 miles in width. The topography varies from mountain crests, characteristic of the western third of the state, to the elevated plains, low mountains, and erosion valleys in the central portions, to the flat terrain in eastern Montana as displayed in Figure 17. Most of the state is rural with only two of the state's cities, Billings located in Yellowstone County and Great Falls located in Cascade County, qualifying as "Standard Metropolitan Statistical Areas".

Table 5

Population Estimates by Age, Race, and Sex
Montana 1978

RACE/SEX	AGE COHORT						
	All Ages	Under 5	5-14	15-24	25-44	45-64	65+
Total	785,000						
White	746,202	59,696	N/A	N/A	N/A	N/A	74,620
Indian	38,798	5,309	12,265	7,313	7,757	4,511	1,645
Reservation Indian*	30,097	4,004	9,394	5,569	6,018	3,640	1,472
Urban Indian**	8,701	1,305	2,871	1,739	1,739	871	173
Helena	1,057	159	349	211	211	106	21
Butte	400	60	132	80	80	40	8
Billings	2,500	375	825	500	500	250	50
Anaconda	515	77	170	103	103	52	10
Great Falls	2,255	338	744	451	451	226	45
Missoula	974	146	321	194	194	97	19
Havre	1,000	150	330	200	200	100	20

SOURCE: Department of Commerce, Bureau of Census Projectsion, July 1978.

SOURCE: Billings Area Indian Health Service, Program Planning and Statistics Bureau, Indian Population by Service Unit and Age Group, 1978.

SOURCE: Indian Alliances reports from stated cities.

NOTE: Measurement error recognized due to lack of uniform data.

* Measurement error possible due to in- and out-migration from reservation to urban area.

** Age cohort percentages used: Under 5--15%, 5-14--33%, 15-24--20%, 25-44--20%, 45-64--10%, 65+--2%.

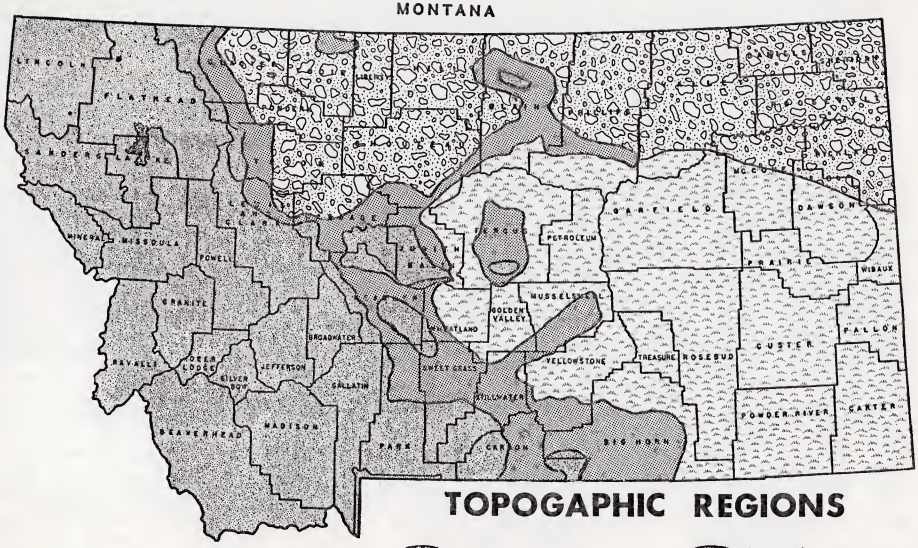

MONTANA
LINCOLN
FLATHEAD
SANDERS
LAKE
MINERAL
MISSOULA
POWELL
GRANITE
RAVALLI
DEER LODGE
SILVER BOW
JEFFERSON
BROADWATER
GALLATIN
BEAVERHEAD
MADISON
PARK
SWEET GRASS
STILLWATER
CARBON
BIG HORN
YELLOWSTONE
TREASURE
ROSEBUD
POWDER RIVER
CARTER
CUSTER
FALLON
PRAIRIE
WIBAUX
GARFIELD
MCCONE
DAWSON
PETROLEUM
MUSSELSHELL
GOLDEN VALLEY
WHEATLAND
TOOLE
PONDERA
GLACIER
LIBERTY
HILL
BLAINE
PHILLIPS
VALLEY
ROOSEVELT
SHERIDAN
TOPOGAPHIC REGIONS
GLACIATED PLAINS
SEDIMENTARY PLAINS
FOOTHILLS
MOUNTAINOUS AREAS

Figure 17

Section 884.13(f)(5)(iii) Cultural and Recreational Values of Montana

Montana contains an abundance of recreational and cultural resources. To enhance these resources many lands have been designated for management purposes. Montana boasts ten National Forests, seven State Forests, nine wilderness areas, three primitive areas, two National Parks, forty-three wildlife management areas, 119 National Historic Register Sites, fifty-seven State parks, monuments, and recreation areas, and numerous fish hatcheries, fishing accesses, wildlife preserves, and camp-sites.

A base map and overlays showing the locations of AML sites and the state's cultural and recreation areas were made (Volume III-B, "Mine Site Index Maps"). These maps will aid in quickly accessing the possibility of AML impact on these areas. Camp-sites were not mapped, but their locations are recorded if they are in the proximity of AML impact.

Of all the managed lands, the AML sites have the most potentially direct impact on National Historic Register Sites. Historically significant mining camps, mill sites, and mine structures remain throughout the state. Virtually all of these historic mine related sites are located on potentially reclaimable AML sites. In order to provide for the preservation of these historic vestiges, the State Antiquities Act (SAA) was created (Montana Session Laws, Chapter 563). Section nine of the SAA provides for State agency participation in historic preservation of Montana:

> Section 9. State agency participation. State agencies shall:
>
> (1) adopt policies for the preservation of heritage properties and paleontological remains on lands owned by the state and avoid, whenever feasible, state actions, or state assisted or licensed actions that substantially alter heritage properties or paleontological remains on lands owned by the state.
>
> (2) identify and develop in consultation with the historic preservation officer, methods and procedures to ensure that the identification and protection of heritage properties and paleontological remains on lands owned by the state are given appropriate consideration in state agency decision making;
>
> (3) deposit in the historic preservation office all inventory reports, including maps, photographs, and site forms, of heritage properties and paleontological remains.

Additionally, Section 106 of the National Historic Preservation Act (P.L. 89-665, Title I) states:

> Sec. 106. The head of any federal agency having direct or indirect jurisdiction over a proposed federal or federally assisted undertaking in any state and the head of any federal

department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site building, structure, or object that is included in the National Register. The head of any such federal agency shall afford the Advisory Council on Historic Preservation established under Title II of the Act a reasonable opportunity to comment with regard to such undertaking.

Many of the state's AML sites may be in the proximity of, or qualify as, historically significant sites. For this reason, the AML staff will consult the appropriate agencies to avoid interference with historic objects and areas, and if necessary have a professional survey conducted to determine cultural and/or historic significance of abandoned mine related structures.

Section 884.13(f)(5)(iv) Hydrology of Montana

Region I

Region I comprises the eastern third of the state. This area has been classified as semi-arid, with an average annual precipitation of 13 inches. A large portion of the precipitation is consumed in evaporation and transpiration, with the remaining portion constituting the region's average annual natural runoff. The region yields approximately two-tenths to one inch per year of natural runoff.

Precipitation generally occurs in the late spring and early summer which creates stream-flow characteristics showing patterned seasonal fluctuations of high springtime, low wintertime stream-flows. But approximately one-half the water flowing through the region originates outside the region so that major springtime flooding will be controlled by conditions elsewhere.

The only major reservoir in the region is the Fort Peck on the Missouri River, just above the Missouri's confluence with the Milk River. Hydro-electric generation was the dam's original purpose; the retained waters are also used for irrigation.

The majority of high quality water in Region I is found under the surface in water bearing rock structures. For our interests only the near surface aquifers will be considered.

Alluvium, which consists of unconsolidated sands and gravels along flood plains and channels of streams and rivers, provides groundwater for irrigation along the Missouri, Tongue, and Powder Rivers. Wells for irrigation drilled into the alluvial deposits generally are less than 75 feet and are capable of providing up to 1500 g.p.m. The other near surface source of groundwater is supplied by the sand and coal beds of the Fort Union Formation. Wells tapping the sand and coal beds of the Fort Union may produce up to 100 g.p.m. of good quality water. Groundwater degradation of the Fort Union aquifers by past mining has not been determined. Aquifers of an older age are too deep in this region to be of concern with past mining activities.

The coal beds of the Fort Union Formation have a low sulphur content and the sulphur present is mostly in an organic form, causing few acid water quality problems. The bare spoil piles within the region, however, are easily eroded by wind and water adding to the natural sediment load of local streams. With low lying stream gradients, most of the sediment load remains in the region, moving downstream during the brief high stream-flow period only.

Table 6

Major, Sub-major, Minor Drainage Basins - Region I

Missouri River Basin	Yellowstone River Basin
-Big Dry Creek	-Sarpy Creek
-Milk River	-Rosebud Creek
-Redwater Creek	-Tongue River
-Poplar River	-Pumpkin Creek
	-O'Fallon Creek

Table 7

Average Discharge (Water Year 1978) -- Region I

Stream	Location	Streamflow (CFS)	Years Measured
Big Dry Creek	Van Norman	56.4	35
Missouri River	Ft. Peck Dam	6,347	5
Milk River	Nashua	716	39
Redwater River	Circle	13.9	40
Poplar River	Scobey	--	3
Poplar River	Poplar	135	41
Missouri River	Culbertson	10,760	28
Sarpy Creek	Hysham	8.42	5
Yellowstone River	Forsyth	14,200	1
Rosebud Creek	Colstrip	36.2	1
Tongue River	Ashland	608	5
Pumpkin Creek	Miles City	20	6
Tongue River	Miles City	455	35
Powder River	Broadus	353	1
Powder River	Locate	637	40
Yellowstone River	Terry	12,236	4
Yellowstone River	Sidney	13,160	66

Hydrology - Region II

The topographic highs within Region II are the uplifted Rocky Mountain Outliers. These mountain ranges typically receive more precipitation than the surrounding semi-arid plains, generally in the form of snow. The moisture rich uplifts, with porous, steeply dipping sediments along their flanks, act as the principle recharge areas for groundwater in the region. Degradation of water quality and quantity by past mining activities in these mountainous areas has not been determined. It would be expected, though, any water quality problems in a recharge area would affect groundwater quality in nearby wells.

The attitude of the sedimentary beds off the flanks of the mountain uplifts are such that under certain circumstances a hydrostatic pressure is created within the water table. Wells drilled in close proximity to aquifer outcrops will flow at the surface due to the hydrostatic head. These geologic structures make the Judith River Formation an important artesian water horizon in Montana.

The Kootenai Formation in the Belt-Sand Coulee coal mining region southeast of Great Falls shows a strong capability to transmit large amounts of water. Where old adits penetrate the coal seam of the Morrison Formation directly underlying the basal sandstone of the Kootenai, a direct outlet for groundwater is created. In October, 1979, Sand Coulee Creek above the area affected by past coal mining was dry, while hundreds of gallons per minute flowed from abandoned adits.

Degradation of surface and groundwaters in the Belt-Sand Coulee area is extensive. The groundwater of the basal sandstone of the Kootenai Formation is allowed to come in contact with atmospheric oxygen and the sulphur bearing pyritic minerals contained in the exposed coal seam. The generalized chemical reaction is as follows:

$$2\ FeS_2 + 2H_2O + 7O_2 \longrightarrow 2\ FeSO_4 + 2\ H_2SO_4$$

Pyrite ---> Ferrous Sulfate + Sulfuric acid

This reaction occurs wherever pyrite is exposed to air and water either naturally or by mining activities. The abandoned hard rock mine sites in the Neihart District of Southeast Cascade County produce the same type of acid drainage.

Two major reservoirs are located in Region II. Fresno Reservoir on the Milk River, northwest of Havre, and the Tiber Reservoir on the Marias River, southeast of Shelby. Both produce hydroelectric power and supply water for irrigation.

The mining of coal and economic minerals outcropping along stream valley or coulee walls create further water quality problems. Wind and water erosion of bare refuse piles and further leaching of minerals and metals found in refuse piles create an additional sediment and chemical load in many streams in Region II.

Table 8

Major, Sub-major, Minor Drainage Basins -- Region II

Hudson Bay Basin
-Grinnell Creek
-St. Mary River

Missouri River Basin
-Sun River
-Missouri River
-Belt Creek
-Milk River

Table 9

Average Discharge (Water Year 1978) -- Region II (in cubic feet per second)

Stream	Location	Average Discharge (CFS)	Years Measured
Hudson Bay Basin			
-Grinnell Creek	Many Glacier, MT	26.1	27
-St. Mary River	Babb, MT	792	44
Missouri River Basin			
-Sun River	Simms, MT	562	12
-Missouri River	Great Falls, MT	7,972	22
-Belt Creek	Monarch, MT	191	27
-Milk River	Havre, MT	273	17

Hydrology - Region III

Precipitation patterns for Region III fall into the same categories as for Regions I and II. These patterns show an average annual precipiation for the semi-arid plains of 12 inches, with surface runoff figures of under one inch annually for the lowlands plains. The uplifted mountain regions received considerably more precipitation, generally in the form of snow. The humid mountain areas are the principle recharge areas for groundwater. Melting snow and rains enter the permeable, steeply dipping sediment beds along the uplifted flanks.

The Fort Union and Kootenai Formations are producers of groundwater when tapped by shallow wells. Mining activities were hampered in many coal fields when water was encountered in underground workings. One mine in the Roundup Coal Field required the pumping of one million gallons of Fort Union ground water daily, in order to operate.

From ground investigations in the Roundup and Red Lodge-Bridger Coal Fields, the Fort Union Formation has not produced water quality problems associated with past mining. Past hard rock mining in the Hughesville District, and in the Little Belt Mountains, has exposed an abundance of pyritic minerals allowing the formation of acid mine drainage. The Dry Fork of Belt Creek is seriously degraded from past mining activities.

Erosion of bare spoil piles and associated sedimentation of receiving streams is a problem in the Red Lodge-Bridger Coal Fields and the mining districts in the Little Belt, Moccasin, and Judith Mountains. The dumping of mine spoils on the flood-plain, and in many instances directly in the stream channel has made this problem inevitable at abandoned mine sites.

One major reservoir is found in Region III, Yellowtail Reservoir on the Bighorn River. Hydroelectric power generation and recreational facilities are products of the Yellowtail Dam.

Table 10 - Major, Sub-major, Minor Drainage Basins -- Region III

Missouri River Basin

-Musselshell River
-Yellowstone River

- -West Rosebud Creek
- -Stillwater River
- -Clarks Fork
- -Rock Creek
- -Big Horn River
- -Little Big Horn River
- -Tullock Creek

Table 11

Average Discharge (Water Year 1978) -- Region III (in cubic feet per second)

Stream	Location	Streamflow (CFS)	Years Measured
Mill Creek	Lewistown	57	18
Musselshell River	Harlowtown	164	68
Musselshell River	Ryegate	184	32
Musselshell River	Roundup	221	32
Musselshell River	Musselshell	209	35
Musselshell River	Mosby	283	46
West Rosebud Creek	Roscoe	131	13
Stillwater River	Absarokee	972	43
Yellowstone River	Laurel	5,813	4
Clarks Fork River	Belfry	954	57
Clarks Fork River	Silesia	1,229	9
Rock Creek	Red Lodge	174	44
Yellowstone River	Billings	7,042	50
Little Big Horn R.	Hardin	325	25
Tullock Creek	Big Horn	19.8	1
Big Horn River	Big Horn	3,966	33

Hydrology - Region IV & V

The northern Rocky Mountain region is an area of extremes. Average annual precipitation varies from 12 inches in the semi-arid intermontane valleys to over 120 inches in the higher elevations. The high mountain ranges intercept much precipitation creating a 'rain shadow' downwind and extending out into the Great Plains.

Surface runoff patterns closely follow precipitation isograde, from under one inch annually in the valleys to over thirty inches annually in the mountainous regions. Even with the very high runoff rates for the upper elevations, the mountain areas are the principle groundwater recharge areas within the region. The aquifers depended upon for most of the groundwater

withdrawal in western Montana are those under the thick alluvial deposits, along the major valley floors, glacial outwash deposits, and tertiary sediments. The high porosity of these deposits allow them to transmit and store large amounts of groundwater in the large intermontane valleys. The quality of western Montana groundwater is very high and may be used for drinking, irrigation, stock, and industrial purposes.

Water quality problems center about the granitic Boulder Batholith. Implaced about 70 million years ago, the associated heat of the molten rock, the pressure gradients created as the body cooled, and the chemical make-up of the host country rocks allowed for large scale economic mineralization. Mining and environmental alteration are synonomous. The magnitude of the degradation is dependent upon the materials mined and mining techniques. When mining began in Montana, environmental problems were of no concern. Mining related water quality problems have occurred in nearly every major drainage basin in central and western Montana. The extent and severity of water quality impacts within this region is too widespread to be dealt with in detail in this section. However, site specific water quality problems are discussed in the AML site description sheets for sites that have been field visited (see Volume II).

A general breakdown of water quality problems within the region is as follows:

Problem Type	Percent
Mine drainage	17
Tailings and spoil piles erosion	34
Placer workings	35
Sand/gravel mining	12
Roads/ground disturbance	2

Although acid mine drainage sites are not as numerous as placer workings, the impact of mine drainage is greater.

There are two major reservoirs in the Rocky Mountain region of Montana, Hungry Horse Reservoir on the South Fork of the Flathead River and Noxon Reservoir on the Clark Fork River. Both dams provide hydroelectric power, and water from Noxon Reservoir is used for irrigation.

Table 12

Region IV Drainage Basins

Missouri River Basin -- East Divide

-Red Rock River
-Beaverhead River
-Big Hole River
-Madison River
-Gallatin River
-Missouri River
-Prickly Pear Creek
-Yellowstone River

Table 12 cont.d

Columbia River Basin -- West Divide

- -Clark Fork River
- -Little Blackfoot River
- -Flint Creek
- -Boulder Creek
- -Rock Creek

Region V Drainage Basins

Columbia River Basin

- -Kootenai River Basin
- -Fisher River
- -Yaak River

Pend Greille Basin

- -Blackfoot River
- -Clark Fork River
- -Bitterroot River
- -Thompson River

Table 13

Average Discharge (Water Year 1978) -- Region IV -- East Divide

Stream	Location	Streamflow (CFS)	Years Measured
Red Rock River	Red Rock	221	5
Beaverhead River	Grant	391	16
Beaverhead River	Dillon	385	17
Beaverhead River	Twin Bridges	414	43
Big Hole River	Melrose	1,163	55
Madison River	McAllister	1,763	40
Gallatin River	Logan	1,057	62
Missouri River	Toston	5,378	43
Missouri River	Helena	--	10
Yellowstone River	Corwin Springs	3,123	72
Yellowstone River	Livingston	3,779	53

Table 13 cont.d

Average Discharge (Water Year 1978) -- Region IV -- West Divide

Stream	Location	Streamflow (CFS)	Years Measured
Little Blackfoot R.	Garrison	176	6
Flint Creek	South Cross	28.7	38
Flint Creek	Maxville	99.6	37
Boulder River	Maxville	47.6	39
Clark Fork River	Drummond	843	6
Mid Fork Rock Creek	Phillipsburg	124	41
Rock Creek	Clinton	618	6

Average Discharge (Water Year 1978) -- Region V

Stream	Location	Streamflow (CFS)	Years Measured
Kootenai River	Libby	12,180	68
Fisher River	Libby	522	11
Yaak River	Troy	916	22
Blackfoot River	Bonner	1,658	42
Clark Fork River	Missoula	3,024	49
Bitterroot River	Darby	937	41
Clark Fork River	Plains	20,010	68
Thompson River	Thompson Falls	485	22

Section 884.13(f)(5)(v) Montana Flora and Fauna

Montana Flora

The Soil Conservation Service (SCS) has developed a climax vegetation map of Montana (Appendix I, page 123) which is a portion of the SCS report "Climax Vegetation of Montana - Based on Soils and Climate" (Ross and Hunter, 1976.) This map conveys an accurate view of potential climax plant communities in the state.

To describe the range mapping units the SCS used the following criteria:

Wetland -- Land where seepage, ponding, etc., raises the water table to above the surface during only a part of the growing season. Too wet for cultivated crops but too dry for common reeds, cattails, or true aquatics.

Subirrigated -- Lands with an effective subsurface groundwater table and water rarely over the surface during the growing season.

Saline Lowland -- Subirrigated and overflow lands where salt and/or alkali accumulations are apparent and salt tolerant plants occur over a major part of the area.

Sands -- Sands and loamy sands more than 20 inches deep.

Sandy -- Coarse to fine sandy loams more than 20 inches deep.

Silty -- Soils more than 20 inches deep of very fine sandy loam, loam, or silt loam. This includes soils with two inches or more loam or silt loam over clayey subsoils.

Clayey -- Granular clay loam, silty clay loam, silty clay, sandy clay, or clay more than 20 inches deep.

Limy -- Soils more than 20 inches deep that are nearly white and very limy (15 percent or more calcium carbonate) within four inches of the surface.

Shallow Clay -- Shallow granular clay soils that are 10 to 20 inches deep to underlying shale or nearly impervious clays.

Shallow -- Soils 10 to 20 inches deep to hard rock or soft beds of decomposed granite, siltstone, or sandstone. Few roots penetrate deeper than 20 inches.

Riverbreaks -- Mixed soils of various depths and textures on steep irregular slopes. Trees may occur in association with shale outcroppings.

Dense Clay -- Relatively impervious, deep, nongranular clays -- may be overlain by thin, ineffectual layers of other materials. The dispersed layer is very hard to extremely hard when dry and very sticky when wet.

Very Shallow -- Areas where few roots can penetrate deeper than 10 inches. Outcropping of gravel or bedrock is characteristic. Joints in bedrock may develop deep soil pockets usually marked by tall grasses, shrubs, or stunted trees.

Saline Upland -- Upland soils more than 20 inches deep with salt and/or alkali accumulations. Salt tolerant plants occur over a major part of the area.

Badlands -- A complex of nearly barren lands broken by drainages intermingled with small grazable areas.

The basis for defining the mapping units for forested land was made by taking areas where the aspect, elevational, soil, and physiographic relationships of the climax overstory tree vegetation were reasonably consistent. The mapping unit definition was developed as a brief generalization of soil properties unique to each unit and soil-parent material-physiographic relationships.

Plant species for each mapping unit are listed in order of dominance as they occur in the plant community. Grassland and forest understory are described in terms of average relative plant composition by weight. Forest overstory is described by relative canopy cover. Plant names used on the map are in accordance with the Soil Conservation Service publication "Standardized Plant Names for Montana".

It must be recognized that an inventory of soil, annual precipitation, and vegetation delineated at the small scale of the attached map is very general. Within the delineations, there may be inclusions and complexes that actually exist but are too small to be shown at the given scale. Site specific vegetation descriptions can be found in the site descriptions contained in Volume II.

Dorn (unpublished manuscript) states that there are six major floras dominating the state at present, and these are superimposed on at least two other major floras which were dominant here in times past. Representatives of each floa follow:

ALPINE FLORA - above timerline (about 7000 ft. or 2135 m. in north to 10,000 ft. or 3050 m. in south). Aster alpigenus, Carex misandra, Eritrichium nanum, Geum rossii, Jancus triglumis, Pedicularis oederi, Ranunculus pygmaeus, Salix reticulata, Senecio fusatus, Silene acaulis, Smelowskia calycina, Trifolium nanum.

ROCKY MOUNTAIN FOREST FLORA - wooded portion of mountains except some areas of northwest part of state; isolated canyons and buttes in eastern and central part of state. Abies lasiocarpa, Picea engelmannii, Pinus contorta, Pinus flexilis, Pinus ponderosa, Pseudotsuga menziesii, Mahonia repens, Vaccinium scoparium, Arnica cordifolia, Astragalus miser, Calamagrostis rugescens, Calypso bulbosa, Carex geyeri, Pedicularis bracteosa. In eastern Montana are found remnants of the Eastern Deciduous Forest Flora including Quercus macrocarpa, Ceanothus herbaceus, Celastrus scandens, and Maianthemum canadense. A few species of the Boreal Forest Flora are found in northwest Montana. These include Betula papyrifera. Picea glauca, Salix candida, and Halenia deflexa.

PACIFIC NORTHWEST FOREST FLORA - wooded portion of mountains in some localities (mostly west slopes) of northwest part of state. Abies grandis, Larix occidentalis, Pinus monticola, Thuja plicata, Tsuga heterophylla, Rhamnus purshiana, Salix sitchensis, Taxus brevifolia, Adenocaulon bicolar, Disporum hookeri, Polystichum minitum, Tiarella trifoliata.

PALOUSE PRAIRIE FLORA - valleys mostly west of Continental Divide. Agropyron spicatum, Festuca idahoensis, Poa secunda, Agoseris heterophylla, Camassia quamash, Clarkia pulchella, Triteleis grandiflora.

GREAT PLAINS FLORA - lower elevations in eastern two-thirds of state, extending into western valleys east of Continental Divide. Amorpha canescens, Calylophus serrulatus, Andropogon gerardii, Astragalus missouriensis, Bouteloua curtipendula, Buchloe dactyloides, Echinacea angustifolia, Liatrix punctata, Petalostemon purpureum, Stipa spartea.

GREAT BASIN FLORA - lower elevations of Beaverhead and Carbon counties and the west edge of Big Horn and Madison counties. Juniperus osteosperma, Artemisia spinescens, Kochia americana, Tetradymia spinosa, Abronia fragrans, Cleome lutea, Malacothrix torreyi, Penstemon lacricifolius.

Several other recognizable groups are found in more than one of the six dominant floras. The Aquatic-Palustrine-Piparian vegetation is found in water or on wet shores and banks. Some species are Betula occidentalis, Cornus stolonifera, Fraxinus pennsylvanica, Populus angustifolia, Salix spp., Carex spp., Juncus spp., Potamogeton spp., Sagittaria cuneata, Scirpus spp., and Typha latifolia. A group of widespread species includes Equisetum arvense, Cystopteris fragilis, Populus termuloides, Prunus virginiana, Campanula rotundifolia, and Geum triflorum. Introductions are primarily restricted to disturbed habitats. These include Agropyron cristatum, Bromus tectorum, Cirsium arvense, Convolvulus arvensis, Halogeton glomeratus, Medicago sativa, Melilotus officinalis, Phleum pratense, Salsola iberica, and Verbascum thapsus.

The following species are endemic to the state: Cardamine rupicola, Cirsium longistylum, Cryptantha sobolifera, Saxifraga tempestiva, Synthyris canbyi, Trisetum orthochaetum.

Dorn (unpublished manuscript) has also made a tentative classification of vegetative types in Montana. The vegetative types are described in the following:

Alpine cushion-turf type: drier ridges and slopes above timerline
Geum rossii, Silene acaulis, Eritrichium manum, Arenaria obtusiloba

Alpine meadow type: well drained slopes and sheltered areas above timberline.

Trifolium parryi

Alpine bog type: wet basins above timberline especially below late snowbanks

Carex spp., Juncus spp., Caltha legptosepala, Sedum rhodanthum

Subalpine larch type: near timberline, mostly NW Montana

Larix lyallii

Whitebark pine type: near timberline

Pinus albicaulis

Limber pine type: near timberline or on windswept foothills and ridges

Pinus flexilis

Spruce-fir type: moist places just below timberline, lower along streams

Picea engelmannii, Picea glauca, Abies lasiocarpa, Vaccinim scoparium, Pedicularis racemosa

Fir-larch type: mountain slopes, mostly NW Montana

Abies grandis, Larix occidentalis, Pinus monticola

Hemlock type: moist mountain slopes, NW Montana

Tsuga heterophylla

Cedar type: moist mountain slopes, mostly NW Montana

Thuja plicata

Lodgepole pine type: well drained mountain slopes

Pinus contorta, Arnica cordifolia, Carex geyeri

Mountain park type: open mountain meadows and slopes below timberline

Potentilla gracilia, Lupinus argenteus, Geranium viscosissimum, Frasera speciosa

Aspen type: moist slopes and valleys

Populus tremuloides, Rosa woodsii, Clematis occidentalis

Douglas-fir type: well drained mountain slopes

Pseudotsuga menziesii, Calamagrostis rubescens, Mahonia repens, Orthilia secunda

Ponderosa pine type: lower mountain slopes, foothills, and water-trapping rock formations and breaks on the plains

Pinus ponderosa, Arctostaphylos uva-ursi

Bur oak type: hills, SE Montana

Quercus macrocarpa

Paper birch type: moist hills, NW Montana

Betula papyrifera

Curl-leaf mountain mahogany type: foothills and lower mountain slopes, often on limestone

Cercocarpus ledifolius

Common mountain mahogany type: foothills, often on limestone

Cercocarpus montanus

Serviceberry type: hills and slopes

Amelanchier alnaifolia, A. utahensis

Skunkbush type: hills and canyons

Rhus trilobata

Bitterbrush type: plains and hills

Purshia tridentata

Rabbitbrush type: plains and hills

Chrysothamus spp.

Mountain big sagebrush type: mountain slopes and plains

Artemisia tridentata spp. vaseyana

Basin big sagebrush type: plains and hills, SW and SC Montana

Artemisia tridentata

Low sagebrush type: plains and hills, SW Montana

Artemisia arbuscula

Black sagebrush type: plains and hills, SW and SC Montana

Artemisia nova

Silver sagebrush type: plains and sandhills

Artemisia cana

Three-tip sagebrush type: plains, hills, and slopes, SW Montana

Artemisia tripartita

Woody aster type: seleniferous soils

Xylorhiza glabriuscula, Arstragalus bisulcatus

Mountain juniper type: lower mountain slopes and foothills

Juniperus scopulorum

Desert juniper type: desert hills, SC Montana

Juniperus osteosperma

Desert badland type: barren desert hills, SC Montana

Platyschkuhria integrifolia, Wyethia scabra, Astragalus hyalinus

Four-wing saltbush type: desert, usually alkaline, and plains

Atriplex confertifolia, Grayia spinosa

Gordon saltbush type: gravelly desert or alkaline areas

Atriplex gordonii, Artemisia spinescens

Greasewood type: alkaline flats, high water table

Sarcobatus vermiculatus

Saltgrass type: alkaline flats

Distichlis stricta, Salicornia rubra, Glaux maritima, Haplopappus uniflorus

Shortgrass prairie type: eastern plains

Buchloe dactyloides, Boutelous gracilis, Koeleria macrantha, Festuca octoflora

Mixed prairie type: plains where moderately moist

Andropogon spp., Agropyron spp., Bouteloua curtipendula, Stipa spp.

Fescue type: valleys and foothills, W and C Montana

Festuca idahoensis, Festuca scabrella, Poa secunda, Agropyron spicatum

Plains cottonwood type: river and stream banks on plains

Populus deltoides, Shepherdia argentea

Box elder-elm-ash type: river and stream banks on plains

Acer negundo, Ulmus americana, Fraxinus pennsylvanica

Hawthorn-wild plum type: stream banks and thickets

Crataegus spp., Prunus americana

Narrowleaf cottonwood type: river and stream banks

Populus angustifolia

Balsam poplar type: stream banks and lake shores

Populus balsamifera

Willow type: swamps and stream banks

Salix spp.

Birch-alder type: swamps and stream banks

Betula occidentalis, Alnus incana, Cornus stolonifera

Sedge meadow type: moist places below timberline

Carex spp., Pentaphylloides floriabunda

Palustrine type: swamps and shores

Typha spp., Scirpus spp., Juncus spp., Carex spp., Eleocharis spp.

Aquatic type: lakes, ponds, and slow streams

Potamogeton spp., Nuphar polysepalum, Myriophyllum spicatum, Hippuris vulgaris

The Federal Register (vol. 40, No. 127) lists ten species as threatened or endangered, and one species as presumed extinct in the state (Tables 14 & 15). Watson (1976) reported that only four of the eleven species in Tables 14 & 15 are actually endangered. The endangered species are: Grindelia howellii, Penstemon lemhienis, Silene spaldingii, and Trisetum orthochaetum. The following paragraphs describe each species habitat and distribution.

Table 14 -- Species Presumed Extinct in Montana

Species and Varieties	Locality	Date last collected	Status*
Trisetum orthochaetum	Missoula, Co., MT	1908	PrEx*

*Presumed extinct

Table 15 -- State List of Endangered and Threatened Species

State	Status	Family	Species
MONTANA	ENDANGERED	Caryophyllaceae	Silene spaldingii
MONTANA	ENDANGERED	Polemoniaceae	Phlox missoulensis
MONTANA	THREATENED	Asteraceae	Grindelia howellii
MONTANA	THREATENED	Boraginaceae	Cryptantha sobolifera
MONTANA	THREATENED	Brassicaceae	Cardamine rupicola
MONTANA	THREATENED	Brassicaceae	Uraba apiculata var. davicsial
MONTANA	THREATENED	Brassicaceae	Rorippa calycina
MONTANA	THREATENED	Portulacaceae	Claytonia flava
MONTANA	THREATENED	Ranunculaceae	Aquilegia jonesii
MONTANA	THREATENED	Scrophulariaceae	Penstemon lemhiensis

Grindelia howellii

Habitat: rocky, granitic clays; 3,800 ft. to 4,400 ft. altitude; open areas in Pseudotsuga menziesii - Larix occidentalis - Pinus ponderosa forest; growing with the following doninants or codominants; Achillea

millefolium, Centaurea maculosa, Cirsium arvense, Epilobium augustifolium, Agropyron caninum, Phleum pratensis, Potentilla gracilis, Geranium viscossissimum, and Melilotus alba.

Distribution: This species is now largely restricted to the foothills of the Swan Range in the Clearwater Valley (of Powell and Missoula Co.) Montana. In Montana, the plants are scattered in usually small populations (5 to 60 plants per site) over approximately 140 square miles.

Penstemon Lemhienis

Habitat: deep rocky, granitic clays; 6,300 ft. to 6,800 ft.; on graduate to steep, south-facing slopes; in sagebrush-grasslands or sagebrush-grasslands/coniferous forest ecotones; growing with the following dominants: Artemesia tridentata, Festuca ovina, Agropyron spicatum, Poa interior, Bromus inermus, Poa scabrella, Chrysothamnus nauseosus, Lupinus sericeus, Pinus contorta, Pinus ponderosa, and Pseudotsuga mensiesii.

Distribution: Penstemon lemhiensis is known only from southwestern Montana and adjacent Idaho. The larger portion of the geographical range is in Montana. Here the species is distributed largely in Beaverhead County -- a single collection is known from southern Ravalli County near the Beaverhead County line. In Montana, the taxon is usually in small populations (5 to 30 plants per site) that are widely scattered over approximately 4,600 square miles. From this area, the species is known from only five localities.

Silene spaldingii

Habitat: sagebrush grassland.

Distribution: Flathead County

Trisetum orthochaetum

Habitat: in a boggy meadow.

Distribution: Known only from the type locality at Lolo Hot Springs, Bitterroot Mountains, Missoula County, Montana. This area has been intensively developed since the plants single find in 1908. It is believed that this species is now extinct in Montana.

There will be little, if any, AML impact on the four endangered species. There are no AML sites in the area where Grindelia howellii is found. There are five hard rock and two coal AML sites in Beaverhead County, the location of the Penstemon Lemhiensis populations. On-site visits will have to determine if the AML sites are located in P. lemhiensis habitat. If a site is located in P. lemhiensis habitat the area will be thoroughly evaluated to prevent the further destruction of this species. Silene spaldingii is located only in Flathead County. There are two

suspected AML coal sites located near Hungry Horse Reservoir in this county. If these sites are located in S. spaldingii habitat, the same precautions will be taken as for P. lemhiensis. Since no AML sites are located near the habitat of Trisetum orthochaetum, and this species is suspected of being extinct, there is little chance of AML impact on this species.

Montana Fauna

The State of Montana is very diverse topographically as well as being a large state. Montana is the fourth largest of the 50 states with an area totaling 147,138 square miles. Montana is about 550 miles in length east to west and almost 325 miles north to south. Elevations range from 12,850 feet at Granite Peak in the south-central portion of the state to 1,820 feet on the Kootenai River at the Idaho line.

The Rocky Mountains occupy the western third of the state. These mountains lie in a generally northwesterly direction in a series of high, parallel mountain ranges. Stretching across the eastern and central two-thirds of the state are the Great Plains. Commencing as broad Piedmont slopes more than 3,500 feet above sea level, the plains slope gently from the foothills of the Rockies toward the northeastern portion of the state (Montana Department of Fish and Game, 1971).

The climate varies greatly with temperatures of a record low of minus 70 degrees F. to summer temperatures of over 100 degrees F. West of the Divide, the climate is of a semi-marine or north-pacific coast type while to the east, a continental climate prevails.

With the varied conditions in Montana, wildlife diversity is high across the state. Numerous species are found throughout the state.

The map figures 18 through 24 give the distribution for most game species in the state (Montana Fish and Game Department, 1971).

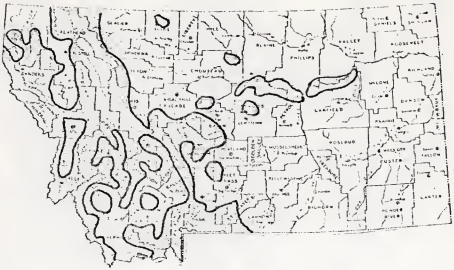
Montana has in its boundaries occurences of the following species of wildlife classified as endangered and threatened by the U.S. Fish and Wildlife Service (1978):

Bear, brown or grizzly	-- Ursus arctos horribilis	-- threatened
Ferret, black-footed	-- Mustela nigripes	-- endangered
Fox, Northern swift	-- Vulpes Velox hebes	-- endangered
Wolf, gray	-- Canis lupus	-- endangered
Crane, whooping	-- Grus americana	-- endangered
Eagle, bald	-- Haliaeetus leucocephalus	-- endangered
Falcon, American-peregrine	-- Falco Peregrinus anatum	-- endangered

Even though the grizzly bear is classified as threatened, Montana has a hunting season for a limited number of grizzly bear each year.

Tables 16, 17, 18, 19 and 20 list mammals, birds, reptiles, amphibians and fishes, respectively, of the State of Montana (Flath, 1978).

MONTANA ELK DISTRIBUTION - 1970.

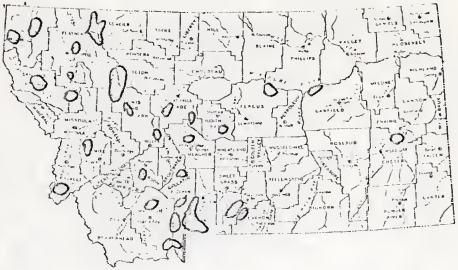


MULE DEER DISTRIBUTION - 1970.

WHITETAIL DEER DISTRIBUTION - 1970.

Figure 18 - Montana Elk, Mule Deer, and Whitetail Deer Distribution.

BIGHORN SHEEP DISTRIBUTION - 1970.



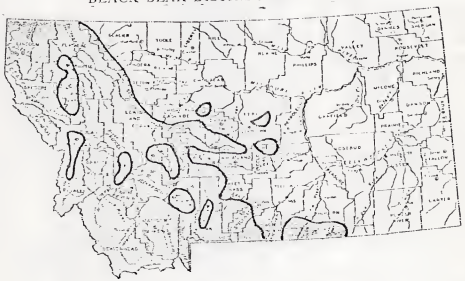
MOUNTAIN GOAT DISTRIBUTION - 1970.

MOOSE DISTRIBUTION - 1970.

Figure 19 - Bighorn Sheep, Mountain Goat and Moose Distribution.

GRIZZLY BEAR DISTRIBUTION – 1970.

BLACK BEAR DISTRIBUTION – 1970.



PRONGHORN ANTELOPE DISTRIBUTION – 1970.

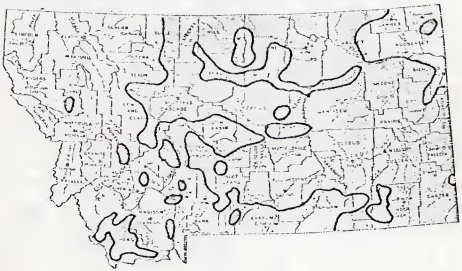
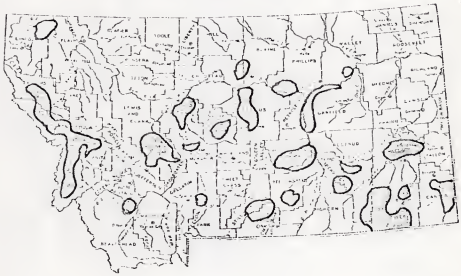


Figure 20 - Grizzly Bear, Black Bear and Pronghorn Antelope Distribution.

RING-NECKED PHEASANT DISTRIBUTION - 1970.

WILD TURKEY DISTRIBUTION - 1970.



HUNGARIAN PARTRIDGE DISTRIBUTION - 1970.

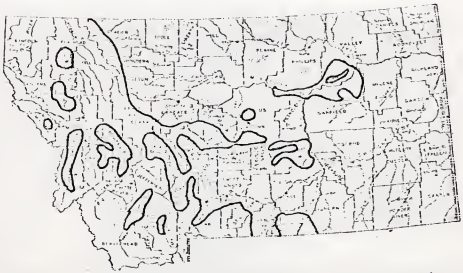
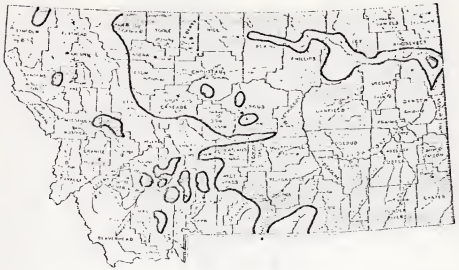
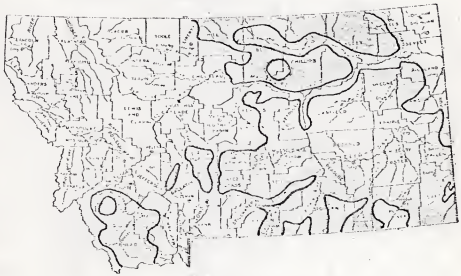


Figure 21. - Ring-necked Pheasant, Wild Turkey and Hungarian Partridge Distr.

SHARPTAIL GROUSE DISTRIBUTION - 1970.



SAGE GROUSE DISTRIBUTION - 1970.



WHITE-TAILED PTARMIGAN DISTRIBUTION - 1970.

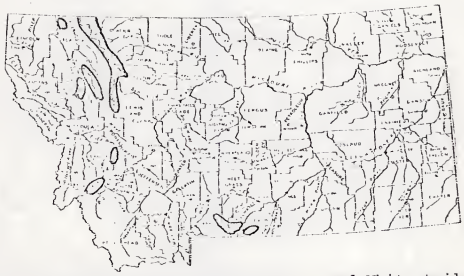
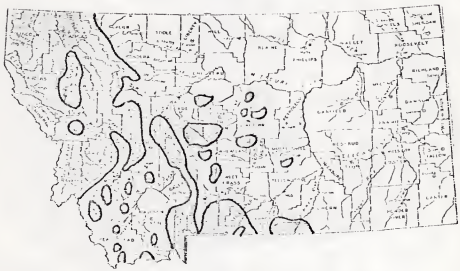


Figure 22 - Sharptail Grouse, Sage Grouse, and White-tailed Ptarmigan Distribution.

BLUE GROUSE DISTRIBUTION - 1970.

RUFFED GROUSE DISTRIBUTION - 1970.



SPRUCE (FRANKLIN) GROUSE DISTRIBUTION - 1970.

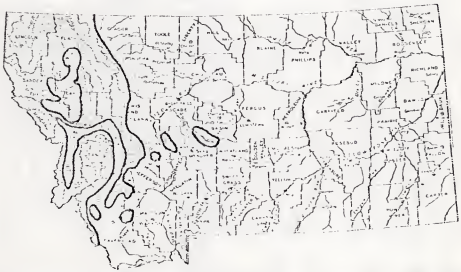


Figure 23 - Blue Grouse, Ruffed Grouse and Spruce (Franklin) Grouse Distribution.

CHUKAR PARTRIDGE DISTRIBUTION – 1970.

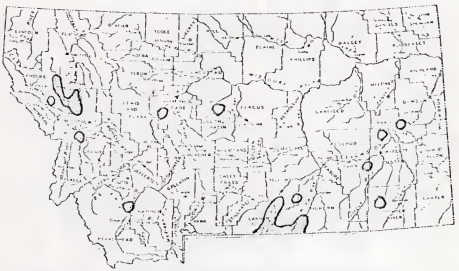


Figure 24 - Chukar Partridge Distribution.

Table 16

MONTANA'S MAMMALS

(G) - Game animal (P) - Predatory animal (F) - Furbearer

	Common Name	Scientific Name	Distribution and Occurrence
	Masked shrew	*Sorex cinereus*	Dry woods, throughout the state.
	Vagrant shrew	*Sorex vagrans*	Moist woods and meadows in western portion, common.
	Merriam shrew	*Sorex merriami*	Sagebrush and grasslands in eastern counties, quite rare.
	Dwarf shrew	*Sorex nanus*	Known from several high mountain ranges in the center of the state.
	Northern water shrew	*Sorex palustris*	Banks of fast streams and shores of high altitude lakes in mountains.
	Preble shrew	*Sorex preblei*	Known from a few specimens in central and eastern Montana, very rare.
	Pigmy shrew	*Microsorex hoyi*	Dry woods of northwestern Montana only, rare.
	Little brown bat	*Myotis lucifugus*	Throughout the state, common.
	Yuma bat	*Myotis yumanensis*	Throughout the state, less common than above.
	Long-eared bat	*Myotis evotis*	Throughout the state, fairly common.
	California brown bat	*Myotis californicus*	Known from Ravalli and Flathead Counties.
	Long-legged bat	*Myotis volans*	Higher elevations in western half of the state.
	Least bat	*Myotis leibii*	Most of the state.
	Fringed bat	*Myotis thysanodes*	Very rare; specimens from Lewis and Clark Caverns and Ravalli County.
	Keen's bat	*Myotis keenii*	Known only from 2 sites in extreme eastern Montana.
	Big brown bat	*Eptesicus fuscus*	Throughout the state, may hibernate in buildings during winter.
	Hoary bat	*Lasiurus cinereus*	Deep woods in summer, probably occurs throughout the state in migration.
	Spotted bat	*Euderma maculatum*	Known only from single specimen obtained at Billings.
	Townsend's big-eared bat	*Plecotus townsendii*	Known from several caves and mines in central and western Montana.
	Silver-haired bat	*Lasionycteris noctivagans*	Wood areas, rather common.
(G)	Black bear	*Ursus americanus*	Forested areas, rather common.
(G)	Grizzly bear	*Ursus arctos*	Remote wilderness areas especially at high elevations, rare.
(F)	Fisher	*Martes pennanti*	Successfully transplanted from British Columbia in 1958-59 near Holland Lake, Missoula County, and Pink Creek, Lincoln County.

Table 16 cont'd

MONTANA MAMMALS

(G) - Game animal (P) - Predatory animal (F) - Furbearer

	Common Name	Scientific Name	Distribution and Occurrence
(F)	Marten	*Martes americana*	Most higher mountain regions, common.
(P)	Short-tailed weasel	*Mustela erminea*	Generally in forested areas, common.
(P)	Long-tailed weasel	*Mustela frenata*	Throughout the state, common.
(P)	Least weasel	*Mustela nivalis*	Eastern half of the state, rare.
(F)	Mink	*Mustela vison*	Marsh areas and stream banks thoughout the state, common.
	Black-footed ferret	*Mustela nigripes*	May occur in the eastern part of the state in prairie dog colonies, extremely rare.
	Wolverine	*Gulo gulo*	Wilder portions of western mountains, rather rare.
(P)	Striped skunk	*Mephitis mephitis*	Throughout the state in farm land and open country, common.
(P)	Spotted skunk	*Spilogale putorius*	Known only from specimens obtained in Ravalli county, and in south central Montana.
	Badger	*Taxidea taxus*	Throughout the state, common.
(F)	River otter	*Lutra canadensis*	On large streams, mostly in western portion, rare.
	Raccoon	*Procyon lotor*	Recent invader from both east and west, now common in large river valleys throughout the state.
	Red fox	*Vulpes vulpes*	Formerly rare through the state but now fairly common.
	Swift fox	*Vulpes velox*	Originally common in eastern counties, now probably extinct.
(P)	Coyote	*Canis latrans*	Throughout the state, common.
	Wolf	*Canis lupus*	Originally present throughout the state, now confined to a few scattered locations in western Montana. Very rare.
(G)	Cougar	*Felis concolor*	Western counties, rare.
	Canada lynx	*Lynx canadensis*	Heavily forested areas in western part of state, rare.
(G)	Bobcat	*Lynx rufus*	In many areas in state, common.
	Yellow-bellied marmot	*Marmota flaviventris*	Rocky areas and mountains of most of the western part of the state, common.
	Hoary marmot	*Marmota caligata*	Above timberline in Glacier National Park and neighboring high mountain ranges, rare.

Table 16 cont'd

MONTANA MAMMALS

(G) - Game animal (P) - Predatory animal (F) - Furbearer

Common Name	Scientific Name	Distribution and Occurrence
Columbian ground squirrel	*Spermophilus columbianus*	Western one-third of the state, common.
Richardson ground squirrel	*Spermophilus richardsonii*	Eastern two-thirds of the state, common.
Uinta ground squirrel	*Spermophilus armatus*	Yellowstone Park and surrounding areas, common.
Thirteen-lined ground squirrel	*Spermophilus tridecemlineatus*	Grassland in eastern and central areas.
Golden-manteled ground squirrel	*Spermophilus lateralis*	Rocky areas in the mountains of central and western regions, common.
Black-tailed prairie dog	*Cynomys ludovicianus*	Formerly abundant in eastern Montana, now much reduced by poisoning.
White-tailed prairie dog	*Cynomys leucurus*	Known only in Carbon County.
Least chipmunk	*Eutamias minimus*	Primarily in sagebrush areas in eastern and central Montana, common.
Yellow pine chipmunk	*Eutamias amoenus*	Lower elevations in western Montana, common.
Rufous-tailed chipmunk	*Eutamias ruficaudus*	Higher elevations in northwestern mountains, common.
Uinta chipmunk	*Eutamias umbrinus*	Higher elevations in the vicinity of Yellowstone National Park.
Red or pine squirrel	*Tamiasciurus hudsonicus*	Coniferous forest in western counties, common.
Northern flying squirrel	*Glaucomys sabrinus*	Dense forest in western counties, common.
Fox squirrel	*Sciurus niger*	In towns and river bottoms along the Missouri and Yellowstone Rivers.
Northern pocket gopher	*Thomomys talpoides*	Throughout the state, common.
Wyoming pocket mouse	*Perognathus fasciatus*	Dry areas in eastern counties.
Great basin pocket mouse	*Perognathus parvus*	Known only from Beaverhead County.
Hispid pocket mouse	*Perognathus hispidus*	Known only from extreme southeastern Carter County.
(F) Beaver	*Castor canadensis*	Along streams and lakes throughout the state, common.
Ord kangaroo rat	*Dipodomys ordii*	Sandy soil and sagebrush in the eastern half of the state.
Northern grasshopper mouse	*Onychomys leucogaster*	Grasslands of eastern Montana.
Western harvest mouse	*Reithrodontomys megalotis*	Grasslands of eastern Montana.
Western deer mouse	*Peromyscus maniculatus*	Throughout the state in virtually all habitats, common.
White-footed mouse	*Peromyscus leucopus*	Eastern Montana.

Table 16 cont'd

MONTANA MAMMALS

(G) - Game animals (P) - Predatory animal (F) - Furbearers

	Common Name	Scientific Name	Distribution and Occurrence
	Bushy-tailed wood rat	*Neotoma cinerea*	Deserted cabins in Rocky Mountain areas, common.
	Northern bog lemming	*Synaptomys borealis*	Only in wet meadows of west side of Glacier National Park, rare.
	Mountain phenacomys	*Phenacomys intermedius*	Mostly near timberline in high mountain ranges.
	Red-backed vole	*Clethrionomys gapperi*	Moist coniferous forests in western half of state, common.
	Water vole	*Arvicola richardsoni*	Stream banks at high elevations in the mountains.
	Meadow vole	*Microtus pennsylvanicus*	Wet meadows throughout the state, common.
	Longtailed vole	*Microtus longicaudus*	Wet woods of central and western Montana, common.
	Mountain vole	*Microtus montanus*	Dry grasslands of western and central Montana, common.
	Prairie vole	*Microtus ochrogaster*	Dry grasslands of eastern Montana, common.
	Sagebrush vole	*Lagurus curtatus*	Sagebrush areas in eastern and central mountains, rare.
(F)	Muskrat	*Ondatra zibethicus*	Ponds and streams throughout the state, common.
	Rocky Mountain jumping mouse	*Zapus princeps*	High mountain meadows and wet woods near water in the western half of the state.
	Meadow jumping mouse	*Zapus hudsonius*	Known only in eastern Montana.
	House mouse	*Mus musculus*	Around human habitations throughout the state, common.
	Norway rat	*Rattus norvegicus*	Known only in some of the cities.
	Porcupine	*Erethizon dorsatum*	Throughout the state, common.
	Nutria	*Myocaster coypus*	Introduced; once found in the Bitterroot Valley and near Billings. Probably extinct.
	Pika	*Ochotona princeps*	Slide rock areas in mountains, common.
	Snowshoe hare	*Lepus americanus*	Forested areas in western half of the state, common.
	White-tailed jack rabbit	*Lepus townsendii*	Open areas throughout the state, common.

Table 16 cont'd

MONTANA MAMMALS

(G) - Game animal (P) - Predatory animal (F) - Furbearer

Common Name	Scientific Name	Distribution and Occurrence
Black-tailed jack rabbit	*Lepus californicus*	Known only in Beaverhead and Madison counties.
Mountain cottontail	*Sylvilagus nuttallii*	Lower elevations in Montana, common.
Eastern cottontail	*Sylvilagus floridanus*	Found only along the extreme eastern border of the state.
Desert cottontail	*Sylvilagus auduboni*	Eastern counties, common.
Pigmy rabbit	*Sylvilagus idahoensis*	Known only in Beaverhead and Madison Counties.
(G) Elk	*Cervus canadensis*	Certain suitable areas in central and western Montana, common.
(G) White-tailed deer	*Odocoileus virginianus*	Forested areas in western Montana and brushy river bottoms in eastern Montana, common.
(G) Mule deer	*Odocoileus hemionus*	Suitable habitats throughout the state, common.
(G) Moose	*Alces alces*	Suitable areas in western half of the state, fairly common.
(G) Woodland caribou	*Rangifer tarandus*	Formerly occurred in Lincoln County, now enter the state from British Columbia, but only rarely and in winter.
(G) Pronghorn antelope	*Antilocapra americana*	Most of eastern and central Montana, common.
(G) Bison	*Bison bison*	Formerly occurred throughout the state, now confined to Yellowstone National Park, the National Bison Range, and in scattered bands on private ranches.
(G) Bighorn sheep	*Ovis canadensis*	In scattered bands in the western half of the state, reintroduced into several mountain ranges.
(G) Mountain goat	*Oreamnos americanus*	High mountain ranges of northwestern Montana, successfully transplanted in several mountain ranges in central Montana.

BIRDS OF MONTANA — 1973

Prepared by C. V. Davis

Supported by Endowment & Research Foundation

Montana State University, Bozeman

Observer .....

Trip	Date	Locality
A	.....	.....
B	.....	.....
C	.....	.....
D	.....	.....

Symbols

•Seldom reported

••Less than 3 records in last 50 years

+Study skins in MSU Museum

†Study skins in U of M Museum

Name in ( ) Based on sight records

B - Breeding records established

b - Breeding based on strong circumstantial evidence

M - Spring and fall migrant only

W - Regular wintering bird

w - Occasionally wintering

Int - Introduced species

Underlines separate the families

1. Common Loon (P2:R18) +†BW
2. (Arctic Loon) (P4:R18) ••M
3. (Red-throated Loon) (P5:R18) •M†
4. Red-necked Grebe (P5:R20) †B
5. Horned Grebe (P8:R20) +†B
6. Eared Grebe (P8:R20) +†B
7. Western Grebe (P9:R20) +†B
8. Pied-billed Grebe (P9:R20) †B+
9. White Pelican (P15:R30) +†B
10. D-c. Cormorant (P18:R34) +†BW
11. Great B. Heron (P21:R94) +†BW
12. Green Heron (P24:R94) ••†
13. (Great Egret) formerly Common E. (P25:R92) ••†
14. Snowy Egret (P25:R92) *†+
15. Black-c Night Heron (P28:R96) +†B
16. Least Bittern (P28:R96) ••†B
17. American Bittern (P29:R96) ••†B
18. Wood Stork formerly W. Ibis (P29.R98) ••+†
19. White-faced Ibis (P30:R98) +*†
20. Whistling Swan (P31:R38) +†M
21. Trumpeter Swan (P31:R38) +†BW
22. Canada Goose (P32:R40) +†BW
23. Black Brant (P33:R40) •+†M
24. White-fronted G. (P36:R42) +†M
25. Snow Geese Includes Blue Goose (P36:R42) +†M
26. Ross' Goose (P37:R42) +†M
27. Mallard (P39:R44) +†BW
28. Black Duck (P39:R44) *†+
29. Gadwall (P40:R46) +†B
30. Pintail (P40:R46) +†BW
31. Green-w. Teal (P41:R48) +†BW
32. Blue-w. Teal (P44:R48) +†B
33. Cinnamon Teal (P44:R48) +†B
34. (European Wigeon) (P44:R46) *†
35. Am. Wigeon (P45:R46) +†BW
36. Northern Shoveler formerly Shoveler (P46:R48) +†BW
37. Wood Duck (P46:R50) +†B
38. Redhead (P46:R52) +†B
39. Ring-necked Duck (P47:R52) +†B
40. Canvasback (P47:R52) +†B
41. Greater Scaup (P48:R52) *†
42. Lesser Scaup (P49:R52) +†B
43. Common Goldeneye (P49:R54) +†BW
44. Barrow's G. (P49:R54) +†BW
45. Bufflehead (P52.R54) +†B
46. Oldsquaw (P52:R56) *++M
47. Harlequin Duck (P53:R56) †B
48. White-w. Scoter (P55:R58) *+†M
49. Surf Scoter (P55:R58) *|M+
50. Ruddy Duck (P56:R60) +†B
51. Hooded Merganser (P57:R60) +†B
52. Common Merganser (P60:R60) +†BW
53. Red-breasted M. (P60:R60) +†B
54. Turkey Vulture (P61:R64) +†B
55. Goshawk (P63:R68) +†BW
56. Sharp-s. Hawk (P63:R68) +†BW
57. Cooper's Hawk (P64:R68) +†B
58. Red-tailed H. (P64:R70) +†BW includes Harlan's H. (P68:R72) †W
59. (Red-shouldered H.) (P68:R70) ••
60. Broad-winged Hawk (P68:R72) +••
61. Swainson's Hawk (P68:R72) +†B
62. Rough-legged H. (P70:R70) +†W
63. Ferruginous H. (P72:R70) +†B
64. Golden Eagle (P72:R70) +†BW
65. Bald Eagle (P73:R70) +†BW
66. Marsh Hawk (P73:R68) +†BW
67. Osprey (P76:R70) +†B
68. Gyrfalcon (P77:R78) *+†W
69. Prairie Falcon (P77:R78) +†BW
70. Peregrine Falcon (P78:R78) •+†BW
71. Merlin formerly Pigeon H. (P78:R78) +†BW
Sparrow Hawk (P79:R78) +†Bw
Sparrow Hawk (P79:R78) +†BW
73. Blue Grouse (P80:R84) +†BW
74. Spruce Grouse (P81:R84) +†W
75. Ruffed Grouse (P81:R84) +†BW
76. Willow Ptarmigan (P84:R86) ••+†
77. White-t. Ptarmigan (P84:R86) †BW+
78. Sharp-tailed G. (P85.R84) +†BW
79. Sage Grouse (P86:R84) +†BW
80. Bobwhite Int., (P86:R90) +† (gone)
81. R-n. Pheasant Int. (P88:R90) ++†BW
82. Chukar Int. (P88:R90) +†BW
83. Gray Partridge Int. (P89:R90) +†BW
84. Turkey Int. (P92:R82) +†BW
85. Whooping Crane (P92:R100) *M
86. Sandhill Crane (P93:R100) +B†
87. Virginia Rail (P94:R102) +BW
88. Sora (P94:R102) +*B
89. (Yellow Rail) (P95:R102) ••
90. (Common Gallinule) (P95:R104) ••
91. American Coot (P96:R104) +†BW
92. Semipalmated P. (P100:R112) +†M
93. (Piping Plover) (P100:R112) *b
94. (Snowy Plover) (P100:R112) ••†M
95. Killdeer (P101:R112) +Bw
96. Mountain P. (P101:R110) +†B
97. Am. Golden P. (P101:R110) *+†M
98. Black-bellied P. (P104:R110) +†M
99. Ruddy Turnstone (P104:R124) *†M
100. (Black T.) (P105:R126) ••†M
101. Am. Woodcock (R126) ••†

Table 17 (cont.)

102. Common Snipe (P105:R126) +†BW
103. Long-b. Curlew (P108:R114) +†B
104. (Whimbrel) (P109.R114) **M
105. Upland Sandpiper formerly U. Plover (P106:R116) +†B
106. Spotted S. (P109: R110) +†B
107. Sol. Sandpiper (P109:R116) +†B
108. Willet (P110:R118) +†B
109. G. Yellowlegs (P111:R118) ++B
110. Lesser Y. (P111:R118) ++B
111. Red Knot formerly Knot (P111:R122) **M
112. Pectoral S. (P112:R122) +†M
113. White-rumped S. (P113:R124) *†M
114. Baird's S. (P112:R124) +†M
115. Least S. (P116:R124) +†M.
116. (Curlew S.) (P340:R122) **
117. Dunlin (P116.R122) *+**M
118. (Short-b. Dowitcher) (P117:R118) *M
119. L.billed Dowitcher (P117:R118) +†M
120. Stilt S. (P117:R118) †M
121. Semipalmated S. (P120:R124) †M
122. W. Sandpiper (P121:R124) †M+
123. Buff-breasted S. (P121:R116) **†M
124. Marbled Godwit (P121:R114) +†MB
125. Hudsonian G. (P122:R114) **†
126. Sanderling (P122:R122) †M+

127. Am. Avocet (P123:R108) ++B
128. (Black-n Stilt) (P125:R106) *†M
129. (Red Phalarope) (P124:R126) *†M
130. Wilson's Phal. (P124:R126) +†B
131. N. Phalarope (P124:R126) +†M
132. (Pomarine Jaeger) (P125:R130) **†
133. (Parasitic Jaeger (P125.R130) **†
134. Long-tailed Jaeger (P126:R130) **†
135. (Glaucous Gull) (P127.R132) **†
136. Herring G. (P130:R134) *MB
137. California G. (P130:R134) ++B
138. Ring-billed G. (P131:R136) ++B
139. Franklin's G. (P132:R136) ++B
140. Bonaparte's G. (P133:R138) †M
141. Sabine's G. (P135:R138) *†
142. Forster's Tern (P136:R142) †MB
143. Common T. (P136:R142) +B†
144. Caspian T. (P140:R144) **M
145. Black T. (P141:R146) ++B
146. Ancient Murrelet (P145:R152) **†
147. (Band-tailed Pigeon) P(145:R154) *†
148. Rock Dove (pigeon) (P145:R154) ++†BW
149. Mourning D. (P153:R154) ++B
150. Passenger P. (extinct)
151. Yellow-b. Cuckoo (P155:R158) *†
152. Black-billed C. (P155:R158) ++B
153. Barn Owl (P156:R162) *-+†
154. Screech Owl (P157:R160) ++BW
155. Flammulated Owl (P157:R160) **†
156. Great Horned O. (P159:R160) +†BW
157. Snowy O. (P159:R162) *†W
158. Hawk O. (P160:R164) *†
159. Pygmy O. (P160:R164) *+†BW
160. Burrowing O. (P162:R164) +†B
161. Barred O. (P162:R162) *†b Hyno (Spotted O.) P162:R162) †
162. Great Gray O. (P163:R162) **†BW+
163. Long-eared O. (P163:R160) ++BW
164. Short-eared O. (P163:R160) +†BW
165. Boreal O. (P164:R164) *+W
166. Saw-whet O. (P164:R164) ++BW
167. Poor-will (P165:R168) +†B
168. C. Nighthawk (P168:R168) ++B
169. Black Swift (P160:R170) †B
170. Chimney S. (P169:R170) †B+
171. Vaux's S. (P170.R170) †B
172. White-throated S. (P170:R170) +†B
173. (R-t Hummingbird) (P171:R172) **+-+
174. Black-chinned H. (P172:R174) B
175. Anna's H. (P172:R172) **†
176. Broad-tailed H. (P173:R172) *†M
177. Rufous H. (P173:R174) +†B Hypo (Allen's H.) (P174:R174)
178. Calliope H. (P174:R172) +†B
179. B. Kingfisher (P177:R178) +†BW
180. Common Flicker formerly Y.-shafted (P178:R180) -+† and Red-shafted F. (P180:R180) +†BW
181. Pileated W. (P180:R180) +†BW
182. Red-headed W. (P184:R184) ++B
183. Lewis' Woodpecker (P184:R184) ++BW
184. Y-b. Sapsucker (P184:R184) ++B
185. Williamson's S. (P185:R184) †B
186. Hairy W. (P186:R186) +†BW
187. Downy W. (P186:R186) +†BW Hypn (White-headed Woodpecker) (P187:R184)
188. Black-backed 3-toed W. (P188:R186) †BW
189. N. 3-toed W. (P188:R186) +†BW
190. E. Kingbird (P189:R192) ++B
191. W. Kingbird (P190:R192) +†B
192. Cassin's K. (P190.R192) +B
193. (Great Crested Flycatcher) (P192:R194)**
194. (Ash-throated Flycatcher) (P193:R194) *
195. Say's Phoebe (P194:R196) +†B
196. Willow Flycatcher "fitz-bew" (was Trail's F.) (P195:R198) +†B
197. Alder Flycatcher "way-be-o" (was Trail's F.) (P195:R198) -+-+
198. Least F. (P195:R198) †B
199. Hammond's F. (P196:R200) ++B
200. Dusky F. (P196:R200) -+†B
201. W. Flycatcher (P197:R200) +†B Hypo (E. Wood Pewee) (P200:R202) †
202. W. Wood P. (P200:R202) +†B
203. Olive-sided F. (P200:R202) +†b
204. Horned Lark (P202:R204) +†BW
205. Violet-green Swallow (P203:R206) +†B
206. Tree S. (P203:R206) +†B
207. Bank S. (P204:R206) ++B
208. Rough-winged S. (P204:R206) +†B
209. Barn S. (P204:R204) +†B
210. Cliff S. (P205:R204) +†B
211. Purple Martin (P205:R205) *-+†b
212. Gray Jay (P206:R210) +†BW
213. Blue Jay (P206:R208) *-+†
214. Steller's Jay (P207:R208) +†BW
215. Black-billed Magpie (P208:R210) +†BW
216. Common Raven (P209:R212) +†BW
217. Common Crow (P210:R212) +†BW
218. Pinyon Jay (P210:R208) +†BW
219. C. Nutcracker (P211:R210) +†BW
220. B-c Chickadee (P211:R214) ++BW
221. Mt. Chickadee (P212:R214) +†BW
222. Boreal C. (P212:R214) †B
223. Chestnut-backed C. (P213:R214) +†Wb
224. W-b Nuthatch (P217:R220) +†BW
225. R-breasted N. (P217:R220) ++BW
226. Pygmy N. (P218:R220) ++†WB
227. Brown Creeper (P218:R220) +†BW
228. Dipper (P219:R218) -+†BW
229. House Wren (P220:R222) ++B
230. Winter W. (P220:R222) BW
231. L-b Marsh W. (P222:R224) +†Bw
232. (S. billed M.W.) (P222:R224) **†
233. Canyon W. (P223:R224) B†
234. Rock W. (P223:R224) ++Bw
235. Mockingbird (P223:R220) **+
236. Gray Catbird formerly Catbird (P224:R220) ++B
237. Brown Thrasher (P224:R226) ++B
238. Sage T. (P227:R226) +†B
239. Robin (P227:R230) -+†Bw
240. Varied Thrush (P228:R230) †BW
241. (Wood Thrush) (P232:R232) **
242. Hermit T. (P228:R232) -+B
243. Swainson's T. (P228:R232) -+†B
244. Gray-cheeked T. (P229:R232) *†
245. Veery (P229:R232) ++B
246. E. Bluebird (P229:R234) +†B
247. W. Bluebird (P232:R234) **Bw
248. Mt. Bluebird (P232:R234) +†Bw
249. T. Solitaire (P232:R230) +†BW
250. G-c. Kinglet (P235:R236) †BW
251. R-crowned K. (P235:R230) +†Bw
252. Water Pipit (P236:R238) ++B
253. Sprague's P. (P237:R238) ++B
254. Bohemian Waxwing (P237:R240) +†Wb
255. Cedar W. (P237:R240) +†Bw
Hypo (Phainopepla) (P238:R240)
256. N. Shrike (P239:R242) -+†W
257. Loggerhead S. (P239:R242) ++B

Table 17 (cont.)

258___Starling Int. (P240:R242) +†BW
259___Solitary Vireo (P243:R244) †B
260___Red-eyed Vireo (P244:R248) +†B
261___Philadelphia V. (P244:R248) **
262___Warbling V. (P244:R248) +†B

263___B.&W. Warbler (P245:R252) *+†
264___Tennessee W. (P248:R256) †B
265___Orange-c.W. (P248:R256) +†B
266___Nashville W. (P249:R250) †B
267___Yellow W. (P251:R260) +†B
268___(Magnolia Warbler) (P251:R260) **
269___Black-throated Blue Warbler (P243:R264) **
270___Yellow-rumped W. formerly Myrtle W. (P252:R260) +†M & Audubon's W. (P253:R260) +†B
271___Townsend's W. (P253:R262) †B
272___(Black-throated Green Warbler) (P251:R263) **
273___Blackburnian W. (P255:R266) *†M
274___Bay-breasted W. (P256:R266) **†M
275___Blackpoll W. (P256:R266) †M
276___Palm W. (P257:R268) *†M
277___Ovenbird (P257:R270) +†B
278___N. Waterthrush (P257:R270) +†B
279___Connecticut W. (P258:R272) **
280___Mourning Warbler (P258:R272) **
281___MacGillivray's W. (P259:R272) +†BW
282___Common Yellowthroat formerly Yellowthroat (P259:R270) +†B
283___Y-breasted Chat (P259:R270) +†B
284___Wilson's W. (P260:R274) +†B
285___Am. Redstart (P261:R274) +†B

286___House Sparrow Int. (P264:R278) +†BW

287___Bobolink (P265:R278) +†B
288___W. Meadowlark (P265:R278) +†Bw
289___Yellow-headed B. (P268:R280) +†B
290___Red-winged B. (P268:R280) +†Bw
292___(Orchard Oriole) (P269:R284) *B†
292___Northern Oriole formerly Baltimore Oriole (P271:R286) +† and Bullock's O. (P271:R286) +†B
293___Rusty Blackbird (P272:R286) +†w
294___Brewer's B. (P272:R280) +†Bw
295___Common Grackle (P273:R282) +†Bw
296___B-headed Cowbird (P273:R282) +†B

297___W. Tanager (P276:R288) +†B
Hypo (Summer Tanager) (P277:R288)

298___Rose-b Grosbeak (P279:R292) *†
299___Black-headed G. (P279:R292) +†B
Hypo (Blue G.) (P280:R292) †
300___Indigo Bunting (P280:R294) *+†
301___Lazuli Bunting (P280:R294) +†B
302___Dickcissel (P281:R302) +†B
303___Evening G. (P282:R292) +†BW
304___(Purple Finch) (P282:R296) *M
305___Cassin's Finch (P283:R296) +†Bw
306___House Finch (P283:R296) †B
307___Pine Grosbeak (P284:R296) +†BW
308___Gray-crowned Rosy Finch (P284:R298) +†BW
309___Black Rosy F. (P285:R298) +†BW
310___Hoary Redpoll (P285:R298) *†W
311___Common R. (P285:R298) +†W
312___Pine Siskin (P286:R300) +†Bw
313___Am. Goldfinch (P286:R300) +†Bw
314___Red Crossbill (P287:R302) +†BW
315___White-w. C. (P288:R302) †W
316___Grn-tailed Towhee (P288:R304) +†B
317___Rufous-sided T. (P289:R304) +†B
318___Lark Bunting (P290:R312) +†B
319___Savannah Sparrow (P290:R308) +†B
320___Grasshopper S. (P290:R308) +†B
321___Baird's S. (P291:R308) +†B
322___LeConte's S. (P291:R310) †B
323___Sharp-tailed S. (P292:R310) **†
324___Vesper Sparrow (P292:R312) +†B
325___Lark Sparrow (P292:R312) +†B
326___(Black-throated S.) (P296:R312) **
327___(Sage Sparrow) (P296:R312) *
328___Dark-eyed Junco formerly White-w. Junco (P297:R314) +†Bw and Slate-colored Junco (P298:R314) +† and Oregon J. (P298:R314) +†Bw
329___Gray-headed J. (P298:R314) **†
330___Tree Sparrow (P299:R318) +†W
331___Chipping S. (P299:R318) +†B
332___Clay-colored S. (P300:R318) †B+
333___Brewer's S. (P300:R318) +†B
334___Field S. (P301:R318) †B
335___Harris' S. (P301:R320) +†Mw
336___White-crowned Sparrow (P302:R320) +†B
337___White-throated S. (P304:R320) †M
338___Fox Sparrow (P304:R322) †B
339___Lincoln's S. (P305:R322) +†B
340___Swamp S. (P305:R322) *†Mw
341___Song S. (P305:R322) +†BW
342___McCown's Longspur (P306:R324) +†B
343___Lapland L. (P306:R324) +†W
344___Chestnut-collared Longspur (P307:R324) +†B
345___Snow Bunting (P307:R324) +†W

Table 18 - Montana Reptiles

Common Name	Scientific Name	Distribution and Occurrence
Snapping turtle	*Chelydra serpentina*	Occupies slow or still waters in eastern Montana.
Painted turtle	*Chrysemys picta*	Lakes and ponds. Abundant statewide.
Spiny softshell	*Trionyx spiniferus*	Rivers of southeastern Montana.
Sagebrush lizard	*Sceloporus graciosus*	Sagebrush areas of southeastern Montana.
Short-horned lizard	*Phrynosoma douglassi*	Drier habitat types east of the divide.
Western skink	*Eumeces skiltonianus*	Dry rocky areas in extreme western Montana. Abundant.
Northern alligator lizard	*Gerrhonotus coeruleus*	Woodlands of western Montana.
Plains hognose	*Heterodon nasicus*	Rare. Sand and gravel areas of eastern Montana.
Rubber boa	*Charina bottae*	Common in the western third of Montana.
Racer	*Coluber constrictor*	Occurs statewide in open or semi-open habitats.
Bullsnake	*Pituophis catenifer*	Common in grassland areas over most of the state.
Milk snake	*Lampropeltis triangulum*	Rare. Occupies a variety of habitat types in southern Montana.
Common garter snake	*Thamnophis sirtalis*	Common statewide in or near water.
Plains garter snake	*Thamnophis radix*	Common in prairie lands and near prairie ponds of eastern Montana.
Western garter snake	*Thamnophis elegans*	Occupies a wide variety of habitat types. Common statewide.
Prairie rattlesnake	*Crotalus viridis*	Common in dry habitat types in most of the state.

Table 19 - Montana Amphibians

Common Name	Scientific Name	Distribution and Occurrence
Pacific giant salamander	*Dicamptodon ensatus*	Cool, wet habitats. Collected in N. Idaho, may occur in Sanders and Mineral Counties.
Long-toed salamander	*Ambystoma macrodactylum*	Moist habitats. Common west of the divide.
Tiger salamander	*Ambystoma tigrinum*	In or near water. Common throughout Montana east of the divide.
Coeur d'Alene salamander	*Plethodon vandykei*	Moist habitats. Very rare, recorded only for northwestern Montana.
Plains spadefoot	*Scaphiopus bombifrons*	Shortgrass prairie. Common east of the divide.
Tailed frog	*Ascaphus truei*	Mountain streams west of the divide.
Western toad	*Bufo boreas*	Moist areas near water. Common in the western half of Montana.
Rocky Mountain toad	*Bufo woodhousei*	Many habitat types. Common throughout southern Montana.
Dakota toad	*Bufo hemiophrys*	Stable ponds. Occurs along the hi-line east of the divide.
Great Plains toad	*Bufo cognatus*	Occupies various habitat types in eastern half of Montana.
Boreal chorus frog	*Pseudacris triseriata*	Near water areas east of the divide.
Spotted chorus frog	*Pseudacris clarki*	Collected only near Fort Benton. Introduced?
Pacific treefrog	*Hyla regilla*	Near water areas. Quite common west of the divide.
Spotted frog	*Rana pretiosa*	Depends on permanent water. Common in western half of Montana.
Leopard frog	*Rana pipiens*	Occupies many habitat types. Common statewide.
Bullfrog	*Rana catesbiana*	Deep water. Introduced to some areas in western Montana.
Wood frog	*Rana sylvatica*	May occur in western Montana, but collection records are lacking.

Table 20 - Montana Fishes

(G) - Game fish

	Common Name	Scientific Name	Distribution and Occurrence
(G)	White sturgeon	*Acipenser transmontanus*	Found only in the Kootenai River, below Kootenai falls.
(G)	Pallid sturgeon	*Scaphirhynchus albus*	Large streams and reservoirs in the Missouri and Yellowstone drainages.
(G)	Shovelnose sturgeon	*Scaphirhynchus platorynchus*	Large streams and reservoirs in the Missouri and Yellowstone drainages.
(G)	Paddlefish	*Polyodon spathula*	Large streams and reservoirs in the Missouri and Yellowstone drainages.
	Shortnose gar	*Lepisosteus platostomus*	Missouri River below Ft. Peck
	Goldeye	*Hiodon alosoides*	Common in the Missouri, Yellowstone and Little Missouri drainages.
(G)	Lake whitefish	*Coregonus clupeaformis*	Introduced. Occurs in Missouri, Clark's Fork, St. Mary and Belly drainages.
(G)	Mountain whitefish	*Prosopium williamsoni*	Abundant in areas near mountains.
(G)	Pygmy whitefish	*Prosopium coulteri*	Cold water lakes west of the Continental Divide.
(G)	Coho salmon	*Oncorhynchus kisutch*	Introduced to the Clark's Fork and Missouri drainages.
(G)	Kokanee	*Oncorhynchus nerka*	Introduced in much of western Montana. Famous for its spawning runs.
(G)	Golden trout	*Salmo aguabonita*	Introduced to high mountain lakes.
(G)	Cutthroat trout	*Salmo clarki*	Widely distributed, but hybridized with rainbow trout in many locations.
(G)	Rainbow trout	*Salmo gairdneri*	Introduced. Occurs nearly statewide.
(G)	Brown trout	*Salmo trutta*	Introduced. Occurs nearly statewide.
(G)	Brook trout	*Salvelinus fontinalis*	Introduced. Occurs nearly statewide.
(G)	Dolly Varden	*Salvelinus malma*	Occurs primarily west of the Continental Divide. Also called "bull trout."
(G)	Lake trout	*Salvelinus namaycush*	Deep, cold lakes nearly statewide. Relatively rare.
(G)	Arctic grayling	*Thymallus arcticus*	Western and southwestern Montana. Range has been reduced in this century.
(G)	Northern pike	*Esox lucius*	Introduced, widely distributed.
	Carp	*Cyprinus carpio*	Introduced to all drainages east of the Continental Divide.

Table 20 cont'd

MONTANA FISHES

(G) - Game fish

Common Name	Scientific Name	Distribution and Occurrence
Goldfish	*Carassius auratus*	Introduced to a few scattered locations east of the Continental Divide.
Golden shiner	*Notemigonus crysoleucas*	Introduced to several locations east of the Continental Divide.
Pearl dace	*Semotilus margarita*	Small, cool streams of northern Montana.
Creek chub	*Semotilus atromaculatus*	Rare, found only in east-central Montana.
Northern redbelly dace	*Phoxinus eos*	Occurs throughout much of the Missouri drainage.
Finescale dace	*Phoxinus neogaeus*	Only hybrids with northern redbelly dace have been found. Rare, in Missouri drainage.
Utah chub	*Gila atraria*	Introduced to the Madison River.
Flathead chub	*Hybopsis gracilis*	Abundant throughout much of eastern Montana.
Sturgeon chub	*Hybopsis gelida*	Rare. Found only in the lower Yellowstone.
Lake chub	*Couesius plumbeus*	Abundant throughout much of eastern Montana.
Peamouth	*Mylocheilus caurinus*	Common west of the Continental Divide.
Emerald shiner	*Notropis atherinoides*	Common in the Missouri and Yellowstone drainages.
Sand shiner	*Notropis stramineus*	Common in the lower Yellowstone.
Brassy minnow	*Hybognathus hankinsoni*	Occurs primarily in the lower Missouri and Yellowstone drainages.
Plains minnow	*Hybognathus placitus*	Occurs primarily in the lower Missouri and Yellowstone drainages.
Silvery minnow	*Hybognathus nuchalis*	Widely distributed in eastern Montana.
Fathead minnow	*Pimephales promelas*	Widely distributed in eastern Montana.
Northern squawfish	*Ptychocheilus oregonensis*	Large streams and lakes west of the Continental Divide.
Longnose dace	*Rhinichthys cataractae*	Abundant statewide.
Redside shiner	*Richardsonius balteatus*	Abundant west of the Continental Divide.
River carpsucker	*Carpiodes carpio*	Fairly common in eastern Montana.
Blue sucker	*Cycleptus elongatus*	Rare. Missouri River and lower Yellowstone.
Smallmouth buffalo	*Ictiobus bubalus*	Common in Ft. Peck reservoir.
Bigmouth buffalo	*Ictiobus cyprinellus*	Common in Ft. Peck reservoir.
Shorthead redhorse	*Moxostoma macrolepidotum*	Common in eastern Montana.
Longnose sucker	*Catostomus catostomus*	Common statewide.
White sucker	*Catostomus commersoni*	Common east of the Continental Divide.

Table 20 cont'd

MONTANA FISHES

(G) - Game fish

	Common Name	Scientific Name	Distribution and Occurrence
	Largescale sucker	*Catostomus macrocheilus*	Common west of the Continental Divide.
	Mountain sucker	*Catostomus platyrhynchus*	Occurs throughout the Missouri and Yellowstone drainages.
	Black bullhead	*Ictalurus melas*	Introduced statewide.
	Yellow bullhead	*Ictalurus natalis*	Introduced to two widely separated sites.
(G)	Channel catfish	*Ictalurus punctatus*	Common in most of eastern Montana.
	Stonecat	*Noturus flavus*	Occurs throughout eastern Montana.
	Trout-perch	*Percopsis omiscomaycus*	Rare. Found only in lower St. Mary lake.
(G)	Burbot	*Lota lota*	Common in most drainages except the Clark's Fork.
	Plains killifish	*Fundulus kansae*	Introduced to the Big Horn River in Wyoming, from where it moved downstream to Montana.
	Mosquitofish	*Gambusia affmis*	Introduced in Granite and Cascade counties.
	Shortfin molly	*Poecilia mexicana*	Introduced in Madison County.
	Variable platyfish	*Xiphophorus variatus*	Introduced in Beaverhead, Madison and Granite counties.
	Green swordtail	*Xiphophorus helleri*	Introduced in Madison County.
	Brook stickleback	*Culaea inconstans*	Tributaries of the Missouri and lower Yellowstone.
	Rock bass	*Ambloplites rupestris*	Introduced to the Tongue River in Wyoming, from whence it moved downstream to Montana.
	Green sunfish	*Lepomis cyanellus*	Invaded from the Dakotas to extreme eastern Montana.
	Pumpkinseed	*Lepomis gibbosus*	Introduced to many scattered locations statewide.
	Bluegill	*Lepomis macrochirus*	Introduced to many scattered locations statewide.
(G)	Smallmouth bass	*Micropterus dolomieui*	Introduced to a few lakes in northwestern Montana.
(G)	Largemouth bass	*Micropterus salmoides*	Introduced to many scattered locations statewide.
	White crappie	*Pomoxis annularis*	Introduced to the eastern third of the state.
	Black crappie	*Pomoxis nigromaculatus*	Introduced throughout eastern Montana.
	Yellow perch	*Perca flavescens*	Introduced to many locations statewide.
(G)	Sauger	*Stizostedion canadense*	Common in the lower reaches of the Missouri and Yellowstone Rivers.

Table 20 cont'd

MONTANA FISHES

(G) - Game fish

	Common Name	Scientific Name	Distribution and Occurrence
(G)	Walleye	*Stizostedion vitreum*	Introduced throughout most of the Missouri and Yellowstone drainages.
	Iowa darter	*Etheostoma exile*	Limited to northeastern Montana.
	Freshwater drum	*Aplodinotus grunniens*	Confined to the lower Missouri and Yellowstone Rivers.
	Mottled sculpin	*Cottus bairdi*	Occurs in mountain streams west of the Continental Divide.
	Slimy sculpin	*Cottus cognatus*	Occurs in mountain streams west of the Continental Divide.
	Torrent sculpin	*Cottus rhotheus*	Restricted to the Kootenai drainage.
	Shorthead sculpin	*Cottus confusus*	Rare. Occurs in northwestern Montana.
	Spoonhead sculpin	*Cottus ricei*	Rare. Occurs in the St. Mary drainage.

Section 884.13(f)(5)(vi) Mineral Resources, Mineral Fuel Reserves, and Geology of Montana

Mineral, Mineral Fuel Reserves

The extractable reserve of a known resource is defined as, "the portion of the identified resource from which a useable mineral and energy commodity can be economically and legally extracted at the time of determination".* Due to the economic parameter in the definition, the reserve of any mineable commodity may change on a weekly basis. The estimate of any resource reserve therefore, must be regarded as just that, a rough estimate, taken from the publications available.

Coal: Production - Reserves

Within 3,000 feet of the surface, the State of Montana has a 222 billion ton reserve of mapped and measured coal. With current mining and exploration increasing significantly in eastern, as well as central Montana, this figure may be obsolete.

Twelve companies are currently permitted to mine coal in Montana, for a 1979 production of 32.5 million tons. Thirty-two point four (32.4) million tons of this total was strip mined from the Fort Union Formation in eastern Montana. It has been estimated that the Fort Union Formation contains 90 percent of Montana's coal reserve, or some 215 billion tons. The remaining reserves are the older, higher grade coal beds of the Judith River and Morrison Formations which outcrop at the surface in central Montana, west of the Fort Union Region. The central coal deposits cannot be strip mined.

Listed in Table 21, are the major coal fields and the individual coal beds mined there. Only those coal seams 5 feet in thickness or greater are mentioned. A map of Montana's coal fields can be seen in Volume III - B, "Mine Site Index Maps".

* Principles of the Mineral Resource Classification System of the U.S. Bureau of Mines and U.S. Geological Survey, Bulletin 1450-A-1976.

Table 21 Coal Regions, Coal Fields, and Coal Beds in Montana

FORT UNION REGION:

1. Decker:

   Roland
   Smith
   Brewster-Arnold
   Anderson
   Dietz

2. Birney-Broadus:

   Broadus
   Knobleck
   Pawnee

3. Ashland-Coalwood:

   Cook Creek
   Cottonwood Creek
   Home Creek
   Foster Creek
   Sand Creek
   Pumpkin Creek
   Tongue River

4. Colstrip-Brandenberg:

   Castle Rock-Armells Creek
   South Coal Bank Coulee
   Greenleaf Creek-Miller Creek

5. Rosebud:

   Rosebud Creek-Tongue River Divide
   Burley

BULL MOUNTAIN REGION:

1. Bull Mountain-Roundup:

   Dorrity
   Dougherty
   Roundup
   Mammoth
   McCeary
   Carpenter
   Kuchts
   Buckley
   Homestead

6. Pine Hills:

   E

7. Wibaux:

   Four Buttes
   Wibaux

8. Richey-Lambert-Savage:

   Carroll
   Lane
   Breezy Flat-Pust
   Fox Lake
   North Fork 13 Mile Creek

9. Southern McCone County:

   Tusler
   R
   S

10. Missouri River North:

    Fort Kipp
    Reserve
    Medicine Lake
    Coalridge
    Lanark

Table 21 cont'd

GREAT FALLS REGION:

1. Belt-Sand Coulee:

   Belt Creek

2. Lewistown:

   Judith River

NORTH CENTRAL REGION:

1. Havre:

   Lance
   No. 1

2. Chinook-Maddux:

   Judith River
   Milk River
   Lance

SOUTH CENTRAL REGION:

1. Red Lodge:

   No. 1 No. 5
   No. 1 1/2 No. 6
   No. 2
   No. 3
   No. 4

2. Bridger-Fromberg:

   Bridger
   Bearcreek
   No. 2
   No. 3
   No. 4

3. Livingston-Trail Creek:

   Maxey
   No. 1
   No. 3

As major utility companies in the northwest push forward with coal fired generation of electricity, renewed mining activity of unstrippable coal reserves in the north and south central coal regions in Montana is likely. Current exploration in the Great Falls Field and Red Lodge Field is taking place. As exploration, development, and production of

coal increases in Montana, so will the economic coal reserves increase. Whether or not renewed mining activities in areas of past mining will interfere with reclamation efforts of past mining degradation remains to be determined.

Oil and Gas: Production - Reserves

In the recent geologic past, the broad structural features of the sedimentary pile in the northern Great Plains acted as vast collecting reservoirs of oil and natural gas. The porous sandstones associated with transport and storage of water also allow gas and oil to migrate to zones favorable to collection. In Montana the producing oil and gas fields are located in the central and eastern sections of the state where the sedimentary rocks were compressionally domed. Six major structural features which have produced gas or oil are found in the Great Plains of Montana. They are: the Sweetgrass Arch, the Catcreek Anticline, Cedar Creek Anticline, the Kevin-Sunburst Dome, Poplar Dome, and Bowdoin Dome.

From the Paleozoic and Mesozoic sediments in central and eastern Montana, oil has been found in 21 different horizons from 220 fields while natural gas has been produced from 16 horizons from 98 fields. Production figures from 1961 and 1979 for gas and oil show that in 18 years, oil production has not changed in volume while gas production has increased by one-third.

With oil and gas prices constantly increasing, a figure of economic reserves for either commodity would not remain current for long. From present estimates though, Montana has an economic reserve of oil and gas that will last through the end of the century. However, with exploration just beginning in the overthrust belt of the Rocky Mountain Front, where vast quantities of oil and gas are believed to exist, reserves of economic potential within Montana may be many more times than now realized.

Metals

The vast majority of current metal production in Montana occurs in the Butte area, Silver Bow County. The Anaconda Company owns and operates an open pit mine where copper is the primary metal extracted. The open pit in Butte yields 99% of the copper, 89% of the silver, and 82% of the gold produced in Montana. The value of metal production in Montana is highly influenced by the copper market because the gold and silver produced from the Butte pit are recovered as by-products of the copper production process. Demonstrated economic reserves in the Butte area consist of a reported 400 million tons of ore available for open pit mining plus an additional 100 million tons of a higher grade ore available for large volume underground mining methods.

Associated minerals also extracted from the pit ore in Butte include zinc, lead, manganese and cadmium.

Production of metals in Montana as well as the number of active metal mines has been on the decline in the past several years. However, with prices for copper, gold, and silver increasing dramatically in the last year, it is expected that exploration and renewed mining of inactive mine districts will be extensive.

Non-metal Minerals

Non-metal resources are an important part of industry for Montana and for the nation. Montana ranked first in the nation in the value of talc produced. Barite, clays, fluorspar, gypsum, phosphate rock, sand and gravel, stone, sulfur, talc, and vermiculite are the principle non-metal mineral resources produced in Montana. Clays and gypsum are the principle non-metal commodities produced in the coal producing region of the state. Sulfur is produced in Billings as a petroleum refining by-product. Sand and gravel pits are generally located so as to utilize the tertiary valley fill sediments of western intermontane valleys. Barite, fluorspar, phosphate rock, talc, and vermiculite are mined in the western mountainous region.

Table 22 -- Non-metal Mineral Production in Montana -- 1978

Commodity	Short Tons
Clays	237,000
Lime	227,000
Sand/Gravel	5,000,000
Stone	4,100,000
Talc	280,000

Production figures for barite, fluorspar, gypsum, phosphate and vermiculite were not included to avoid disclosing individual company confidential data. At the present production rates, non-metal mineral resources will not be depleted in the foreseeable future. As population increases in the north Rockies, many of the non-metal mineral commodities will become increasingly attractive for production.

Geology Region I

The geologic history of eastern Montana involves the accumulation of a sedimentary pile two to three miles in thickness. During the Paleozoic Era, some 500 million years past, Montana was a flat plain periodically covered by shallow seas. Massive limestone deposits were laid down up to 5,000 feet thick. During the Upper Paleozoic Era and throughout the Mesozoic Era the shallow inland sea regressed and transgressed across Montana. The geologic record bears this out in that marine deposits grade into terrestrial sediments which then are overlain by younger marine deposits. The upper 6,000 feet of this stratagraphic

column are Upper Mesozoic/Lower Cenozoic in age and are almost entirely interbedded shales and sandstones. This suggests that around 60 million years ago a change in land level or sea level occurred, and the depositional environment was primarily terrestrial. Alluvial and glacial deposits overlay these younger sediments in large areas.

Structural features of the sedimentary beds in eastern Montana consist of broad basins and arches created by compressional crustal forces. Localized faulting of the sedimentary beds occurred where applied forces exceeded the elastic limit of the faulted rock.

Within Region I of Montana the principle rock formation that outcrops at the surface is the Fort Union Formation of Lower Tertiary Age. The Fort Union Formation consists of continental deposits having been laid down on land largely by river deposition on a coastal plain. Swamps developed, allowing accumulation of vegetable matter later being buried beneath the oncoming stream of sediment. These river deposits of sand, mud, and silt were irregular in distribution and extent. Individual beds are not continuous for great distances nor are they constant in thickness.

In Montana the Fort Union Formation has been divided into five members. The Tongue River member of the Fort Union Formation is the chief coal bearing horizon in Montana, with as many as 26 different coal beds having been mapped. The coal of the Fort Union is an important energy commodity in that it contains low amounts of sulfur and ash.

Geology Region II

The prominent geologic features within Region II are the Rocky Mountain Outliers. In concert with the main, mountain building process of the Rocky Mountains to the west, the rising of igneous rock through the crust caused localized uplift of the sedimentary pile. The Little Rocky Mountains, southwest of Malta, and the Highwood Mountains east of Great Falls both have cores of younger volcanic rock. The molten igneous rock rose through the overlying sediments, spilling out at a surface fissure as a volcanic eruption. The Bearpaw Mountains south of Havre formed when molten igneous rock intruded layers of sediment, crystallizing beneath the land surface. The associated heat, pressure gradients, and magmatic waters of the molten intrusives gave rise to economic mineralization in all 3 uplifts. Old hardrock mines are found in all 3 mountain areas with current mining and exploration continuing today.

The sediments exposed at the surface within Region II are generally older than those found further east in Region I. That the younger sediments are not found at the surface throughout the great plains area of Montana is probably explained by uplift combined with erosion of the younger sedimentary beds. The attitudes of these sediments are generally flat lying except along the flanks of the mountain uplifts, where the sedimentary beds dip steeply away. The formations found at

the surface within Region II, which are of importance here, are the Judith River, Kootenai, and Morrison formations.

The Judith River Formation of Cretaceous Age is chiefly of terrestrial origin, laid down by rivers on a coastal plain. The Judith River is from 400 to 600 feet thick and consists of interbedded sands, shales, and layers of coal. Workable coal seams occur in several localities as in the Missouri River Field near Cascade, and the Milk River Field near Havre.

The Kootenai Formation of Lower Cretaceous Age outcrops in a large area southeast of Great Falls. This formation is from 300 to 500 feet thick and is primarily composed of two massive sandstone members separated by shales. The basal sandstone of the Kootenai outcrops as a prominent ridge and generally yields large amounts of water in central Montana. The Morrison Formation, Jurassic in age, underlies the Kootenai Formation in central Montana. The Morrison is less than 100 feet thick and consists of variegated shale with beds of sandstone. In the Great Falls Coal Field, the coal seam mined at Belt and Sand Coulee is situated in the Upper Morrison in contact with the basal sandstone of the Kootenai Formation.

The coal deposits of the Judith River and Morrison Formations in Region II are older and of a higher grade than the coal mined from the Fort Union Formation in the eastern part of Montana. But the coal found in the Morrison Formation contains a higher percentage of reactive, mineralized sulfur which creates water quality problems not generally associated with coal mining in the western United States.

Geology - Region III

The zone of localized uplifts east of the Rocky Mountain Front, described in Region II, also extends into Region III. Structural deformation of the Paleozoic and Mesozoic sediments of central Montana coincided with the Rocky Mountain orogeny to the west. Crustal compressional forces caused the sediments to dome and in instances, to break. The Big Horn, the Big Snowey, Little Snowey, and Little Belt Mountains are all examples of uplifted arches found in Region III. This type of mountain formation lacks a source of heat during uplift, as a result, recrystallization and economic mineralization would not be expected.

The Judith and Moccasin Mountains north of Lewistown contain cores of granitic rock that were intruded as molten magma between layers of sedimentary rock. This episode of intrusion occurred after the Rocky Mountain orogeny began. As the granitic magma cooled, hydrothermal mineralization occurred, setting the stage for hard rock mining activity. Today, both the Judith and Moccasin Mountains are impacted by past mining practices.

The coal bearing sediments that outcrop in Region III are the same as those found in Region I and Region II, with the exception of the Eagle Formation. Stratagraphically the Eagle Formation is located below the Judith River Formation and above the Kootenai Formation, all of which are Cretaceous in age. The Eagle Formation consists of a massive, grey sandstone which forms conspicuous bluffs in south central Montana. The Trail Creek Coal Field developed southeast of Bozeman in order to extract a coal seam associated with the Eagle Formation.

The Fort Union Formation outcrops in Region III in large tracts around Roundup and the Red Lodge-Bridger area. The Kootenai Formation is found at the surface in Region III south of the Moccasin-Judith Mountain uplift, around Lewistown. Extensive coal mining took place in the Roundup, Red Lodge-Bridger, and Lewistown Coal Fields up until the 1950's. With increasing interest in fossil fueled electricity generation, expanded coal exploration by private industry is currently being undertaken in Roundup and Red Lodge-Bridger coal fields.

An important difference exists between the coal seams of the Fort Union Formation and the coal found in the Kootenai-Morrison Formations. This difference between the two coal horizons concerns the sulfur content and the form in which the sulfur is found. The coal mined from the Morrison Formation in the Belt-Sand Coulee and Lewistown coal fields has a relatively high sulfur content, and is in the form of reactive, pyritic minerals which will form acids when in contact with water and oxygen. The coal of the Fort Union Formation in eastern Montana has a lower sulphur percentage, and the sulfur present is in a less reactive organic form instead of being concentrated in mineral form. As a consequence of this difference in sulfur content and form, abandoned coal mines within the Fort Union Coal Beds typically do not experience the problems of acid mine drainage associated with the abandoned mines of the Kootenai-Morrison coal horizon.

Geology - Regions IV & V

The geology of Regions IV and V will be viewed collectively due to its complexity and similarity in both regions. Regions IV and V comprise the mountainous western third of Montana where the first mining activities within the state took place in the 1850's.

During most of the Precambrian, all of the Paleozoic, and most of the Mesozoic eras, the Rocky Mountain region of Montana appears to have been an essentially flat plain partially covered by shallow seas. A vast sedimentary pile accumulated. During the early Cretaceous period some 70 million years past, a mass of hot, semi-solid rock began to rise from the earth's interior, lifting, stretching, and heating the continental crust. The crust responded by breaking up into long, narrow blocks. Some of these blocks were raised higher, becoming mountain ranges, while those lower became high intermontane valleys.

Due to the uplifting, slabs of sedimentary rock moved en masse as thrust faults. The Montana Sawtooth Range and the ranges of Glacier National Park, are examples of thrust faults when younger sediments lie below older rock formations. Throughout, heat was accumulating within the continental crust, melting large volumes of rock. Some of this molten magma rose as large bodies which crystallized before reaching the surface, becoming implaced or intruded plutons. Other bodies of molten magma reached the surface and were erupted from volcanoes, covering large areas with volcanic rock.

Three major plutons, or batholiths, were implaced in Montana. The Idaho batholith, the Boulder batholith, and the Tabacco Root batholith all comprise the cores of major mountain ranges. The Idaho batholith did not produce rich mineralized veins of economic minerals in Montana as did the Boulder and Tabacco Root batholiths because of the chemical differences in the composition of the intruding magmas and the intruded host rocks.

During the upper tertiary period the Rocky Mountain region was a virtual desert. Sediment was not washed away by stream action and so collected in the intermontane valleys. Thousands of feet of sand, gravel, and mud accumulated. With the end of the Tertiary period and the onset of the Pleistocene Epoch, the Age of Ice, the region ceased to be an arid desert. An increase in precipitation established a system of streams which began to remove some of the valley sediments. Alpine glaciation was present in Montana as snow accumulated in the higher elevations. A valley glacier flowed south out of Canada and dammed the drainage of the Clark Fork River forming two glacial lakes. The deposits in western Montana valleys are extensive, and contain scattered deposits of lignite coal.

Through at least four different glacial periods this cycle was repeated, with glacial Lakes Missoula and Kootenai filling behind a dam of ice and water draining an estimated 36 different times. Glacial period deposits may be found as benches high up the sides of the foothills in many western Montana valleys.

The present landscape is controlled by the streams flowing out of the mountains joining together to form the great rivers, whose valleys have been deeply cut in recent geologic times.

Section 884.13(f)(5)(vii) Benefits From AML Reclamation

Expected benefits from the AML program:

(i) Protection of human life, health or safety.
(ii) Protection of the environment, including air and water quality, abatement of erosion and sedimentation, fish, wildlife, and plant habitat, visual beauty, historic or cultural resources and recreation resources.
(iii) Protection of public or private property.
(iv) Abatement of adverse social and economic impacts of past mining on persons or property including employment, income, and land values or uses, or assistance to persons disabled, displaced or dislocated by past mining practices.
(v) Improvement of environmental conditions which may be considered to generally enhance the quality of human life.
(vi) Improvement of the use of natural resources, including post-reclamation land uses which:
  (a) increase the productive capability of the land to be reclaimed;
  (b) enhance the use of surrounding lands consistent with existing land use plans;
  (c) provide for construction or enhancement of public facilities;
  (d) provide for residential, commercial, or industrial developments consistent with the needs and plans of the community in which the site is located.
(vii) Demonstration to the public and industry of methods and technologies which can be used to reclaim areas disturbed by mining.

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MONTANA'S ABANDONED MINE LAND (AML) STATE RECLAMATION PLAN

In Response to
TITLE IV of PL 95-87

VOLUME II

Montana AML Inventory, Problem Areas, and Reclamation Program

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Introduction

The bulk of Volume II contains site specific data collected from the inventoried AML sites. Also included is an explanation of the method used to inventory the Montana AML sites, a description of the problem areas found in the state, a description of general reclamation techniques, the estimated quantities of acres of land disturbed, the estimated miles of streams degraded, the list of verified AML sites, and the lists of potential AML coal and hard rock sites, a description of existing land use planning in Montana, and Montana AML reclamation scheduling and cost proposals.

Field work will continue until all verified and potential AML sites have been visited. A number of the verified and potential AML sites may not be eligible for reclamation under 30 CFR Part 884. Therefore, the information contained in this volume, and on the maps in the map portfolio, will be periodically updated as more site information is obtained.

Site Location Sources, Methodology

An initial inventory of the abandoned mine lands in Montana was conducted at the onset of the project. Personnel contacts were made with, and literature was obtained from, several federal agencies: the E.P.A., M.S.H.A., S.C.S., U.S.G.S., B.L.M., and U.S.F.S.; and several state agencies: the Department of Fish, Wildlife and Parks, the Dept. of Health and Environmental Sciences - Water Quality Bureau, the Dept. of Natural Resources & Conservation, the Montana Bureau of Mines and Geology, and Dept. of State Lands - Hard Rock, Coal, and Opencut Bureaus. From the information obtained, a preliminary site list for both AML coal and hard rock sites was made.

Noting that the AML Program is concerned with the reclamation of all AML coal sites and only those AML hard rock sites which constitute a health or safety hazard, or are environmentally unsound, the approach to formulating a master AML coal site list and a master AML hard rock list was varied. The master AML coal site list was made after aerial reconnaissance verified the existance and location of all the suspected AML coal sites. The master AML hard rock site list was made after a literature search and contacts with appropriate individuals and agencies revealed only those sites which presented a danger to public health and safety, or those sites which have degraded, or are actively degrading the environment.

Field work was conducted in the Fall of 1979 to collect as much on-site information as possible before winter set in. The initial field work was concentrated in those areas of high AML impact. Using the master lists, county highway maps, U.S.G.S. topographic quads, and information provided by local residents, the suspected sites were located. Three major coal areas (Red Lodge, Sand Coulee, Lewistown), two major hard rock areas (Corbin-Wickes, Cooke City) and several isolated AML coal and hard rock sites were visited. Field work will continue until all necessary field data has been gathered.

General Problems and Problem Areas Found in Montana

A wide variety of AML problems have been found in the state. These problems include: barren dumps, collapsing structures, unobstructed mine openings, acid mine drainage, heavy metal pollution, erosion and sedimentation, subsidence, burning dumps, air pollution, and aesthetic disaminities. In addition to the above problems, there are non-mine related problems such as the use of AML sites as dumping grounds. Each AML site in Montana has at least one or more of the aforementioned problems. A description of these problems can be seen in Section 884.13(c)(1), page 10 of Volume I.

The general reclamation techniques which will be utilized to abate the problems listed above and in Section 884.13(c)(1) include:

Problem	Reclamation Technique
Acid mine drainage, Toxic metal pollution	1. Plug and seal open portals 2. Prevent contact of both oxygen and water with reactive sulphide minerals. 3. Abate the flow of water through affected areas 4. Lower local groundwater levels with recropping techniques 5. Pond or treat polluted waters 6. A combination of above measures.
Mine openings	1. Block, plug, backfill adits 2. Fence, cap, fill shafts
Mine dumps, Spoil area	1. Eliminate by removing and burying, or remining 2. In place reclamation by contouring, sealing, topsoiling, and revegetating 3. A combination of above measures
Subsidence	1. Hydraulically backfill old workings 2. Daylight the mine area
Erosion and Sedimentation	1. Revegetate barren spoil piles 2. Remove spoil piles from drainages 3. Combination of vegetation and structural measures 4. Mulches of organic materials, or petro-chemical compounds 5. Surface water management
Burning coal waste banks	1. Internal and surface grouting 2. Excavate with high pressure water 3. Remove, extinguish, and dispose of waste bank

Old Structures

1. Remove
2. Rehabilitate to a sound condition

Costs for some reclamation techniques are listed below.*

Underground Mine Seals:

Class	Mine Condition	Average Cost Per Seal
Class I	(Dry)	$ 5,500
Class II	(Wet, accessible entry)	$14,400
	(Wet, inaccessible entry)	$15,000
Class III	(Wet, moderately difficult to seal)	$22,000
Class IV	(Wet, major discharge, difficult to seal)	$45,000
Class V	(Cannot safely be sealed with current technology) Treatment of acid mine drainage is alternative	

Burning Refuse Piles:

1. Internal and surface grouting; $1.25 cubic/yard
2. Pile excavated, extinguished, and disposed; $1.40 cubic/yard

Refuse Piles:

1. Steep slope terrain;
   -Remove and dispose $465,000/acre
   -Inplace revegetation $4,200/acre
2. Shallow slope terrain;
   -Contour and revegetate $16,900/acre
3. Level terrain;
   -Contour and revegetate $14,300/acre

Subsidence:

1. Backfilling and Grading $1.50/cubic yard
2. Sealing with Butyl Sheet $1.00/square foot
3. Construction of Drainage Channel $3.00/cubic yard

Montana tentatively contains 320 AML coal sites and 134 AML hard rock sites. Forty-three of Montana's fifty-six counties have AML sites. Thirty-two counties have AML coal sites and seventeen counties have AML hard rock sites. Table 1 lists the major AML problem areas in Montana and Table 2 lists the miles of streams in Montana degraded by acid mine drainage and toxic metals. Tables 3 and 4 give a more detailed breakdown of area of AML disturbance and mine affected waters in the state, respectively.

*Inactive and abandoned underground mines; water pollution prevention and contro. EPA 440/9-75-007. June, 1975.

Table 1 - Major AML Problem Areas

AML COAL

Area	Coal Field
Belt	Great Falls Field
Bridger	Bridger Field
Colstrip	Fort Union Formation
Eastern Montana*	Fort Union Formation
Havre-Chinook	North Central Region
Hughs	Great Falls-Lewistown Field
Lewistown	Lewistown Field
Red Lodge	Red Lodge Field
Roundup	Bull Mountain Field
Sand Coulee	Great Falls Field
Trail Creek	Livingston-Trail Creek Field

*Particularly Daniels, Richland, Roosevelt, and Sheridan Counties.

AML HARD ROCK

Area	County
Cooke City	Park
Corbin-Wiches	Jefferson
Flint Creek Range	Granite
Hughsville	Judith Basin
Lincoln	Lewis & Clark
Neihart	Cascade

Table 2 -- Miles of Streams Degraded by Acid Mine Drainage and Toxic Materials*

Basin	Miles of Degraded Streams
Upper Missouri	20
Missouri - Sun - Smith	50
Upper Yellowstone	35
Upper Clark Fork	84
	190 Total

*Water Quality in Montana, 305 Report, May 7, 1976. Pursuant to Public Law 92-500, Section 305(b), Water Quality Bureau, Department of Health and Environmental Sciences, Helena, Montana

Table 3

Approximate Acreages of AML Disturbance*

County	Acres AML Coal	Acres AML Hard Rock
Beaverhead	7-12	275-300
Big Horn	15-30	none
Blaine	45-80	none
Broadwater	5-10	350-385
Carbon	330-380	none
Carter	30-40	none
Cascade	480-525	100
Choteau	13	none
Custer	9-17	none
Daniels	45-70	none
Dawson	40-75	none
Deer Lodge	none	25-45
Fallon	3-11	none
Fergus	65-100	70-100
Flathead	?**	none
Gallatin	30-35	none
Garfield	6-8	none
Granite	none	865-1010
Hill	70-75	none
Jefferson	none	425-480
Judith Basin	75-130	200
Lewis & Clark	none	165-310
Lincoln	none	30-50
McCone	17-19	none
Madison	?**	130-150
Meagher	none	25-50
Mineral	none	15-30
Missoula	none	20-35
Musselshell	300-360	none
Park	45-65	75-100
Powder River	50-65	none
Powell	none	235-275
Prairie	3-6	none
Richland	75-110	none
Roosevelt	90-110	none
Rosebud	170-210	none
Sanders	none	35-60
Sheridan	185-205	none
Silver Bow	none	105
Toole	?**	none
Valley	20-35	none
Wibaux	10-15	none
Yellowstone	?**	none
TOTAL	2233-2811	3145-3785

*Sources: AML coal-aerial reconnaissance; AML hard rock - Hard Rock Bureau, Department of State Lands.

** Three or fewer sites -- acreage unknown.

Table 4 -- Montana Waters Not Meeting the Objectives of Public Law 92-500*

UPPER MISSOURI BASIN

Stream Segment	Affected Miles	Grid Coordinates	Problem
Boulder River	7	6N5W18	Toxic metals from past mining
High Ore Creek	6	7N5W36	Toxic metals from past mining
Cataract Creek	6	7N5W36	Toxic metals from past mining
Grasshopper Creek	15	8S11W	Sediment from past mining
Spring Creek-Prickly Pear Creek	6+	4N7W11	Toxic metals from past mining
Dry Fork Belt Creek & Belt Creek	25	15N8E	Metals and acid from past mining
Sand Coulee Creek & Missouri River	13+	18N5E	Metals and acid from past mining
Confederate Gulch	6	9N2E	Sediment from past mining

UPPER YELLOWSTONE BASIN

Upper Stillwater River	35	8S14E	Toxic metals from past mining

UPPER CLARK FORK BASIN

Silver Bow Creek & Upper Clark Fork River	60	3N8W	Metals and nutrients from past mining
Blackfoot River	24	15N6W	Metals from past mining
Brock Creek	5	10N10W	Nutrient sediment from past mining

*Water Quality in Montana, 305 Report, May 7, 1976. Pursuant to Public Law 92-500, Section 305(b), Water Quality Bureau, Department of Health and Environmental Sciences, Helena, Montana.

Table 5 lists Montana AML sites which have been, as explained earlier, verified either by aerial reconnaissance, literature search, or the contacts that were made with appropriate individuals or agencies. The sites listed in Table 5 are mapped on the 1:250,000 scale maps in Volume III A.

Tables 6 and 7 list potential AML coal and hard rock sites respectively. Information about these sites was received from various sources after the initial site inventory was taken.

All inventoried AML sites, both verified and potential, will be ground checked to gather the information necessary to complete the AML site sheets (pages 160+). The information from the site sheets will be used to evaluate both the impacts of each site and the reclamation necessary to correct the impacts. By the completion of the inventory phase of the Montana AML Reclamation Program, all sites will have been visited, studied, and appropriately acted upon according to the procedures set forth in Volumes I & II.

TABLE 5

VERIFIED MONTANA AML SITES

January 1, 1983

County	Quad (1:250,000)	Site# & Name	Legal Description
Beaverhead	Dubois	1-1 Ames	S35, 36, T11S, R12W
		1-2 Peterson	S11, 13, 14, T12S, R12W
		1-3 Argenta Mill Site	S30, T6S, R10W
		1-5 Ermont	S35, T6S, R11W
		1-6 Gold Leaf & Hendrich	S8, T8S, R11W
		1-7 Goldsmith	S30, T6S, R10W
		1-8 Smith-Dillon	S23, T8S, R10W
		1-9 Elkhorn	S11, 14, T4S, R12W
Big Horn	Hardin	2-2 Dick	NE1/4, S5, T1N, R37E
		2-5 Romine	NE1/4, S20, T1N, R37E
Blaine	Havre	3-1 Dehl, Radar, Redkop*	SW1/4, NW1/4, S5, T31N, R19E
		3-2 Fox	NE1/4, S10, T32N, R18E
		3-3 Mashke	NW1/4, S11, T32N, R18E
		3-4 Milk River	SW1/4, S7, T33N, R19E
		3-5 Perkins*	NE1/4, S18, T33N, R19E
		3-6 Vandeven*	SE1/4, S23, T34N, R19E
		3-7 Warburton	S6, T31N, R20E
Broadwater	White Sulphur Springs	4-1 Lombard*	S12, T4N, R2E
		4-2 Sixmile	S14, 15, T5N, R5E
		4-3 Big Deal	S13, T5N, R1W
		4-4 Black Friday	NW1/4, S24, T5N, R1W
		4-5 Confederate Gulch	S13, 24, 25, T10N, R2E
		4-6 Custer-Hyantha	NE1/4, S24, T8N, R1W
		4-7 Hard Cash	S10, T5N, R1W
		4-8 January	S26, T8N, R1W

County	Quad (1:250,000)	Site # & Name	Legal Description
Broadwater (cont.)		4-9 Keating, Ohio	S18, T5N, R1E
		4-10 Kleinschmidt	SE1/4, S3, T8N, R1W
		4-11 R&S Iron	SE1/4, S12, T5N, R1W
		4-12 Park	S10, 11, 14, 15, T7N, R1W
		4-13 St. Louis	S23, 26, T7N, R1W
		4-14 Vosburg	NW1/4, S3, T8N R1W
Carbon	Billings	5-1 Bear Creek Strip Mine*	NE1/4, S7, T8S, R21E
		5-2 Black	NW1/4, S30, T5S, R23E
		5-3 Foster Gulch*	SW1/4, SW1/4, S8, T8S, R21E
		5-4 Foster Gulch Strip Mine*	SE1/4, S8, T8S, R21E
		5-5 Kohler	NW1/4, S18, T5S, R23E
		5-6 Lindsay	SW1/4, S7, T5S, R23E
		5-7 New Bridger	S17, 20, 32, 33, T6S, R23E
		5-8 Pasquale, Schmidt	NW1/4, NE1/4, S28, T8S, R21E
		5-9 Red Lodge NE*	NW1/4, S26, T7S, R20E
		5-10 Red Lodge SE*	SW1/4, S26, T7S, R20E
		5-11 Saysell	NE1/4, S13, T8S, R23E
		5-12 Smith*	NW1/4, SE1/4, S6, T8S, R21E
		5-13 Washoe Dump*	SE1/4, NE1/4, S1, T8S, R20E
		5-14 Elbow Creek	S25, 26, T4S, R22E
		5-15 Burns	SW1/4, S6, T8S, R21E
		5-16 Coulee	SW1/4, S6, T8S, R21E
		5-17 Highway	SE1/4, S6, T8S, R21E
		5-18 Virtue Gulch	S31, T7S, R21E
		5-19 Pasquale	NW1/4, S28, T8S, R21E
		5-20 Washoe Strip Mine	NW1/4, S6, T8S, R21E
		5-21 Bear Creek Dump	NE1/4, S1, T8S, R20E
		5-22 Red Lodge W. Bench	S27, T7S, R20E
Carter	Ekalaka	6-1 Carter, Tartar-Turbivilla	SE1/4, SW1/4, S6, T14, R62E
		6-2 Collins	NW1/4, S11, T2N, R58E
		6-3 Dague	NW1/4, S19, T2N, R57E
		6-4 Hoag	SE1/4, S10, T3S, R62E
		6-5 Latham-Jennings	NE1/4, S22, T2S, R62E
		6-6 Nims	SE1/4, S2, T2N, R58E
		6-8 Stitser	S14, T2N, R58E

County	Quad (1:250,000)	Site # & Name	Legal Description
Cascade	Great Falls, Stockett (1:62,500)	7-1 Antelope Creek*	NE1/4, S5, T19N, R5W
		7-2 Antelope Creek Subsidence*	NW1/4, S5, T19N, R5W
		7-3 Armington	NE1/4, SE1/4, S36, T19N, R6E
		7-4 Armington Coulee*	NW1/4, SW1/4, S31, T19N, R7E
		7-5 Belt A*	W1/2, S26, T19N, R6E
		7-6 B&M Coulee*	NE1/4, SE1/4, S23, T19N, R6E
		7-7 Centerville A*	S20, T19N, R5E
		7-8 Brown*	SE1/4, NW1/4, S18, T19N, R5E
		7-9 Centerville B*	S19, T19N, R5E
		7-10 Centerville C*	S18, T19N, R5E
		7-11 Centerville D*	S18, T19N, R5E
		7-12 Centerville E*	SE1/4, NE1/4, S18, T19N, R5E
		7-13 Centerville F*	SE1/4, SW1/4, S18, T19N, R5E
		7-14 Centerville G*	NE1/4, NW1/4, S19, T19N, R5E
		7-15 Centerville SW*	S19, T19N, R4E
		7-16 Centerville Mobile Homes*	S19, T19N, R5E
		7-17 Cottonwood Seeps*	S31, T19N, R5E
		7-18 Cozzens, et. al.	NE1/4, S18, T17N, R3E
		7-19 East Belt Mine*	NE1/4, NE1/4, S23, T19N, R6E
		7-20 Giffen*	SW1/4, NE1/4, S14, T18N, R4E
		7-21 Houndcreek A	SW1/4, NE1/4, S25, T17N, R2E
		7-22 Houndcreed B	NW1/4, NE1/4, S25, T17N, R2E
		7-23 Houndcreek C	NE1/4, NE1/4, S25, T17N, R2E
		7-24 Lewis Coulee*	NE1/4, S26, T19N, R6E
		+7-25 Molton*	SW1/4, SE1/4, S29, T14N, R8E
		7-26 North Belt Mine*	SE1/4, SE1/4, S14, T19N, R6E
		7-27 North End, NW Slope, Sand Coulee*	S13, T19N, R4E
		7-28 Number Five Coulee*	NW1/4, S36, T19N, R4E
		7-29 Number Five Coulee Mouth*	SW1/4, NE1/4, S25, T19N, R4E
		7-30 O'Neil	SW1/4, NW1/4, S20, T19N, R3W
		+7-31 Queen of the Hills*	SE1/4, SW1/4, S29, T14N, R8E
		7-32 Sand Coulee Midtown*	SE1/4, NW1/4, S13, T19N, R4E
		7-33 Sand Coulee North*	NW1/4, S13, T19N, R4E
		7-34 SE Belt*	SW1/4, NE1/4, S26, T19N, R6E
		7-36 Stockett NE*	SE1/4, NE1/4, S36, T19N, R4E

County	Quad (1:250,000)	Site # & Name	Legal Description
Cascade (cont.)	Great Falls, Stockett (1:62,500)	7-37 Stockett SE*	NW1/4, SE1/4, S36, T19N, R4E
		7-38 Stockett West Ridge*	NE1/4, SW1/4, S36, T19N, R4E
		7-39 Subsidence NW Centerville*	NE1/4, NW1/4, S19, T19N, R5E
		7-40 Tracy*	NE1/4, SW1/4, S7, T19N, R5E
		7-41 Tracy NE, A*	NE1/4, NE1/4, S7, T19N, R5E
		7-42 Tracy NE, B*	NW1/4, NE1/4, S7, T19N, R5E
		7-43 Tracy South*	NW1/4, NW1/4, S18, T19N, R5E
		7-44 Tracy SW	NW1/4, NW1/4, S13, T19N, R5E
		7-45 Upper Cottonwood A*	S7, T18N, R5E
		7-46 Upper Cottonwood B*	S7, T18N, R5E
		7-47 Upper Cottonwood C*	S6, T18N, R5E
		7-48 Upper Sand Coulee A*	SW1/4, SW1/4, S13, T19N, R4E
		7-49 Upper Sand Coulee B*	NE1/4, S23, T19N, R4E
		7-50 Western	S3, T18N, R4E
		7-51 Eagle Rock	NW1/4, S19, T19N, R2W
		7-52 Belt W. Bench	NE1/4, S26, T19N, R6E
		7-53 Tracy Triangle	S12, T19N, R4E
		7-54 French Coulee	S26, T19N, R6E
	Cascade	7-55 Neihart District	S22, 27-33, T14N, R8E
Choteau	Havre	8-1 Nygard	SE1/4, NE1/4, S18, T28N, R14E NE1/4, NE1/4, S19, T28N, R14E
Custer	Miles City, Forsyth	9-3 Hay Creek 30	S30, T13N, R45E
		9-4 Hay Creek 35	S35, T5N, R45E
		9-5 Storm King	S4, T7N, R49E
		9-6 Winkle	NE1/4, S14, T7N, R49E
		9-7 Kucher	S20, T8N, R48E
Daniels	Wolf Point	10-1 BNS	S34, T37N, R47E
		10-5 Lekvold, Shaw	S12, T33N, R47E
		10-10 Nay-Butler	SE1/4, S20, T36N, R47E
		10-11 Nelson	S28, T37N, R47E
		10-16 White	NW1/4, S36, T37N, R48E

County	Quad (1:250,000)	Site # & Name	Legal Description
Dawson	Glendive	11-2 Clear Creek	SW1/4, NW1/4, S15, T14N, R54E
	Miles City	11-3 Johnson Hill	SW1/4, NW1/4, S32, T20N, R54E
		11-4 Peuse	NE1/4, S14, T16N, R33E
		11-5 Medike	SW1/4, S28, T17N, R55E
Deer Lodge	Butte	12-1 Blue Eyed Nellie	S14, T5N, R12W
		12-2 Cable	SW1/4, S10, T5N, R13W
		12-3 Champion	S28, 30, T6N, R8W
		12-4 Gold Coin	NE1/4, S20, T5N, R13W
		12-5 Alturas	S19, T5N, R13W
		12-6 Douglas Creek	S27, T8N, R12W
		12-7 Gospel Hill	SE1/4, S28, T6N, R8W
		12-8 Iron Mine	S9, 10, T5N, R13W
		12-9 Minnehaha	S9, T5N, R13W
		12-10 Red Rump	S4, T5N, R13W
		12-11 Silver Lake	S21, 22, T5N, R13W
		12-12 Silver Reef	S22, T5N, R13W
		12-13 Southern Cross	NW1/4, S9, T5N, R13W
		12-14 Cottonwood	S7, 8, T5N, R8W
Fergus	Lewistown	14-2 Brown*	S24, T15N, R19E
		14-3 C. McDonald*	SW1/4, S35, T15N, R19E
		14-4 Divide*	S13, 14, T15N, R19E
		14-5 F. McDonald	N1/4, S35, T15N, R19E
		14-6 Forestgrove	SE1/4, S5, T14N, R21E
		+14-7 Giltedge*	SE1/4, SE1/4, S18, T16N, R20E
		14-8 Linn, Tuss	NW1/4, S34, T15N, R20E
		14-9 Phillips, Flanigan*	NE1/4, S4, T14N, R21E
		14-10 Skaggs*	S13, T15N, R19E
		14-11 Small Prospects*	S13, T15N, R19E
		14-12 Swanson*	SE1/4, S10, T15N, R20E
		14-13 Barnes	S32, T18N, R18E
		14-14 Kendall	S31, T18N, R18E
		14-15 McEvaney	S25, 26, T16N, R19E
		14-16 North Moccasin	S29, T18N, R18E
		14-17 Whiskey Gulch	S30, T16N, R20E

County	Quad (1:250,000)	Site # & Name	Legal Description
Gallatin	Bozeman	16-1 Anaconda Copper	SE1/4, SE1/4, S27, T2S, R7E
		16-2 Miller	SW1/4, NW1/4, S27, T2S, R7E
		16-3 Mountainside Mine	SW1/4, S17, T2S, R7E
		16-4 Timberline	S23, T2S, R7E
Granite	Butte	20-1 Bi-Metallic	NE1/4, SE1/4, S32, T7N, R13W
		20-2 Camp Creek	S30, T7N, R13W
		20-3 Douglas Creek	S25, 36, T9N, R13W
		20-4 Forest Rose	S22, T9N, R12W
		20-5 Frost Creek	S31, T7N, R13W
		20-6 Hidden Lake	S35, T6N, R13W
		20-7 Lower Princeton Placer	NE1/4, S25, T8N, R13W
		20-8 Master Mine	S14, T8N, R12W
		20-9 Mill	Boulder Creek
		20-10 Moonlight	SW1/4, S18, T8N, R12W
		20-11 New Seattle	S9, T8N, R13W
		20-12 Non Pariel	SW1/4, S32, T8N, R12W
		20-13 North Fork Dump	NW1/4, S33, T76N, R13W
		20-14 Old Red Mill	S36, T7N, R14W
		20-15 Pineau Placer	S14, T8N, R12W
		20-16 Port Royal	S27, 34, T8N, R12W
		20-17 Red Lion	SW1/4, SE1/4, S14, T6N, R13W
		20-18 Rumsey	NE1/4, NW1/4, S8, T6N, R12W
		20-19 Scratch Awl	SE1/4, NW1/4, S29, T7N, R13W
		20-20 Thursday-Friday	NW1/4, SW1/4, S20, T8N, R12W
		20-21 UI Mine	S10, T8N, R12W
		20-22 Unidentified Mine	S20, T10N, R16W
		20-23 Wasa	S27, T9N, R12W
		20-24 Archegan	S5, T8N, R13W
		20-25 Brooklyn	S4, 5, T7N, R12W
		20-26 Boulder Creek	S25, T8N, R13W
		20-27 Jackson Park	S9, T7N, R13W
		20-28 Lycoming	S17, T7N, R13W
		20-29 Moose Lake	S25, T4N, R16W
		20-30 Mt. Powell	S17, T8N, R13W

County	Quad (1:250,000)	Site # & Name	Legal Description
Granite (cont.)	Butte	20-31 Parnell Group	S7, 8, T7N, R13W
		20-32 Pineau Placer	S10, 11, T8N, R12W
		20-33 San Francisco	S30, T7N, R13W
		20-34 Welcome Hill	S31, T6N, R12W
Hill	Havre	21-1 Hubbs, Gertson	SW1/4, S24, T33N, R15E
	Shelby	21-2 Larson*	NW1/4, S25, T33N, R15E
		21-3 Morton	NW1/4, S32, T32N, R16E
		21-4 Ness	NE1/4, S29, T37N, R9E
		21-5 Reyda	SW1/4, S19, T31N, R16E
		21-6 Roberts*	SW1/4, S5, T31N, R17E
		21-7 SCS 29, 30*	S29, 30, T33N, R16E
		21-8 SCS 31*	S31, T33N, R16E
Jefferson	Butte, White Sulphur Springs	+22-1 Alta*	S9, 10, T7N, R4W
		+22-2 Bertha*	SE1/4, S3, T7N, R4W
		+22-3 Bluebird*	SW1/4, NE1/4, S13, T7N, R5W
		+22-4 Corbin Flats*	S1, T7N, R4W
		+22-5 Gregory*	S4, T7N, R4W
		+22-6 Liverpool*	S33, T9N, R3W
		+22-7 Washington*	SE1/4, NW1/4, S17, T7N, R4W
		22-8 Bullion	S13, T7N, R6W
		22-9 Comet/Rumley	S6, T6N, R4W
		22-10 Cresent	S28, T8N, R5W
		22-11 Edelweiss	S1, 2, T7N, R5W
		22-12 Lucky Hit	S19, T2N, R4W
		22-13 Lump Gulch	NE1/4, NW1/4, S6, T8N, R3W
		22-14 Old Mine Dump	S17, T7N, R3W
		22-15 Pilot	S4, T6N, R4W
		22-16 Salvidor	SW1/4, S18, T7N, R4W
		22-17 Skookum	S1, 12, T6N, R5W
		22-18 Tourmaline Queen	S22, 26, 36, T6N, R3W
		22-19 Wood Chute Creek	N1/2, S20, T7N, R4W
		22-20 Alport	S31, T6N, R5W
		22-21 Aquarius	S13, T6N, R6W
		22-22 Australia	S31, 32, T7N, R4W

County	Quad (1:250,000)	Site # & Name	Legal Description
Jefferson (cont.)	Butte, White Sulphur Springs	22-23 Australian	S31, T7N, R4W
		22-24 Big Major	S4, T4N, R5W
		22-25 Black Patch	S1, 2, T6N, R5W
		22-26 Boyles, Finn, Alta Gulches	S13, 14, 15, T6N, R7W
		22-27 Elkhorn Queen	S26, T6N, R3W
		22-28 Crawley	SW1/4, S12, T7N, R5W
		22-29 Grey Eagle	S35, T7N, R5W
		22-30 Hattie Ferguson	S28, T7N, R5W
		22-31 Josephine	S26, T8N, R6W
		22-32 Mantle	S8, 9, T6N, R5W
		22-33 Marsh	S35, T2N, R6W
		22-34 May & Little Sally	S1, T7N, R5W
		22-35 Mina	S8, 17, T7N, R4W
		22-36 Basin Mill Tailings	S17, 18, T6N, R5W
		22-37 Morning Glory	S33, T7N, R5W
		22-38 New Stake	S9, T8N, R3W
		22-39 Perry Parks	S36, T8N, R6W
		22-40 Placer Parriot	S1, T2N, R6W
		22-41 Relief	S11, T6N, R3W
		22-42 Salvidor	S18, T7N, R4W
		22-43 Saturday Night	S5, T6N, R5W
		22-44 State	S16, T4N, R5W
		22-45 Summit	S16, T4N, R5W
		22-46 Warm Srings	S30, T8N, R2W
Judith Basin	Great Falls, Roundup	+23-1 Block P	SW1/4, S6, T15N, R9E
		23-2 Dover	SW1/4, S29, T12N, R14E
		23-3A Hughes Site A	SE1/4, S13, T15N, R11E
		23-3B Hughes Site B	SE1/4, S18, T15N, R12E
			SW1/4, S17, T15N, R12E
		23-3C Hughes Site C	SE1/4, SE1/4, S19, T15N, R12E
		23-3D Hughes Site D	S21, T15N, R12E, E1/4, S16, T15N, R12E
		23-3E Hughes Site E	NE1/4, S29, T15N, R12E
		23-3F Hughes Site F	SW1/4, S28, T15N, R12E
		+23-4 Hughsville Tailings	SE1/4, S13, T15N, R8E
		23-5 Raynesford Mine A	NW1/4, S21, T17N, R8E

County	Quad (1:250,000)	Site # & Name	Legal Description
Judith Basin (cont.)	Great Falls, Roundup	23-6 Raynesford Mine B	NE1/4, S32, T17N, R9E
		23-7 Raynesford Mine C	SW1/4, S33, T17N, R9E
		23-8 Raynesford Mine D	SE1/4, S33, T17N, R9E
		23-9 Miner	SE1/4, S31, T16N, R12E
		23-10 Olson	SW1/4, S16, T12N, R14E
		23-11 Ridgeway, Higgens	S2, T15N, R11E
		23-12 Noller	S29, T17N, R9E
		23-13 Coal Mine Coulee	S2, T15N, R11E
		23-14 Keating	S21, T12N, R14E
		23-15 Utica	S18, T14N, R13E
		23-16 Gold Bug	S29, T14N, R10E
		23-17 Dr. Kalloch	S6, T15N, R9E
Lewis & Clark	Butte, Choteau	+25-1 Anaconda*	SE1/4, SE1/4, S21, T15N, R6W
		+25-2 Glory Hole*	NW1/4, NW1/4, S10, T9N, R4W
		+25-3 Justice Mine*	NE1/4, SW1/4, S6, T8N, R5W
		+25-4 Mike Horse*	SE1/4, S28, T15N, R6W
		+25-5 Mine Above Rimini*	NW1/4, SW1/4, S4, T8N, R5W
		+25-6 Peerless*	SE1/4, NW1/4, S21, T8N, R5W
		+25-7 Red Water Mine*	SW1/4, NW1/4, S4, T8N, R5W
		+25-8 Valley Forge Mine*	NW1/4, SW1/4, S33, T9N, R5W
		25-9 Adele	S28, 29, T16N, R7W
		25-10 Armstrong	S6, T8N, R5W
		25-11 Beatrice	S1, T8N, R5W
		25-12 Blackfoot Belle	S21, T15N, R6W
		25-13 Crystal	S10, T13N, R7W
		25-14 Golden Messenger	S4, T11N, R1W
		25-15 Empire	S33, 34, T12N, R6W
		25-16 Heddelston	S22, T15N, R6W
		25-17 Pearl	S30, T10N, R5W
		25-18 May Lilly	S20, T8N, R5W
		25-19 Red Mountain	S4, 10, T8N, R5W
		25-20 7 Up Pete	S29, T14N, R2W
		25-21 Silver Crescent	S29, 30, T8N, R5W
		25-22 Whitlatch	S10, T9N, R4W
		25-23 Scratch Gravels	S26, 27, 34, 35, T11N, R4W

County	Quad (1:250,000)	Site # & Name	Legal Description
Lincoln County	Kalispell	27-1 Big Eight	S19, T31N, R34W
		27-2 Branigan	S1, T26N, R31W
		27-3 Linstead	S17, 20, T29N, R27W
		27-4 Midas	S19, T27N, R30W
		27-5 Snowshoe	S7, T28N, R31W
		27-6 Cherry Creek	S26, 27, T29N, R31W
		27-7 Keystone	S17, T34N, R33W
		27-8 Morning Glory	S16, 17, T34N, R33W
		27-9 Mt. Vernon	S5, 6, T28N, R34W
		27-10 Silver Butte	S7, T25N, R30W
		27-11 Sylvinite	S17, T34N, R33W
McCone	Jordan, Glendive	28-1 Adrian	SW1/4, S5, T21N, R49E
		28-2 Berry, Creel	SE1/4, NE1/4, S24, T18N, R47E
		28-3 Carlson, Stalheim	SW1/4, S22, T25N, R47E
		28-4 Enquist, Dunlap	NW1/4, SW1/4, S30, T18N, R47E
		28-7 Redwater	SE1/4, NE1/4, S1, T20N, R49E
		28-8 Verstegan	NW1/4, S21, T24N, R48E
Madison	Ashton	29-1 B&H Group	S10, T34S, R4W
		29-2 Curley Bill	S10, T34S, R4W
		29-3 Booth	S21, T11S, R3W
		29-4 Browns Gulch	S16, 21, T6S, R3W
		29-5 Gold Bar	S33, T6S, R3W
		29-6 Liberty	S29, T2S, R3W
		29-7 Mayflower	S32, T1N, R3W
		29-8 Rochester District	S31, 32, T2S, R7W
		29-9 Silver Star	S18, T2S, R6W
		29-10 Smuggler	S13, T4S, R4W
Meagher	White Sulpher Springs	30-1 Benton Gulch	S5, 6, 7, T10N, R3E
		30-2 Black Hawk	S36, T9N, R8E
		30-3 Camas Creek	S18, T9N, R4E
		30-4 Cumberland	S14, T8N, R8E
		30-5 Copperopolis	S29, T10N, R9E

County	Quad (1:250,000)	Site # & Name	Legal Description
Mineral County	Wallace	31-1 Nancy Lee	S31, 32, T18N, R26W
		31-2 Silver Cable	S24, T20N, R32W
		31-3 Tarbox	S36, T20N, R31W
Missoula County	Hamilton, Butte	32-1 Copper Cliff	S11, T12N, R15W
		32-2 Old Mill	S24, T12N, R17W
		32-3 San Martina	S21, 22, T17N, R24W
		32-4 Hellgate	S4, T13N, R19W
Musselshell	Roundup, Forsyth	33-1 Berten	SW1/4, S2, T5N, R25E
		33-2 Carlson	SW1/4, S28, T8N, R27E
		33-3 Johnson	NE1/4, S2, T5N, R26E
		33-4 Keene	SE1/4, NE1/4, S27, T9N, R30E
		33-5 Knez	NW1/4, S12, R25E
		33-6 Nelson	NE1/4, S18, T8N, R30E
		33-7 Perry	NE1/4, S10, T8N, R31E
		33-8 Roundup Coal	NW1/4, S24, T8N, R25E
		33-9 Wade	NW1/4, S10, T5N, R28E
		33-10 Charter*	S3, T6N, R27E
		33-11 Fragacich	SE1/4, S26, T6N, R26E
		33-12 Gustafson (also see Republic)	NW1/4, S4, T7N, R26E
		33-13 Jeffries	S1/2, S18, T8N, R26E
		33-14 Jonnie's Mine	S15, T7N, R26E
		33-15 Klein	SW1/4, S36, T8N, R25E
		33-16 Kopper	NE1/4, S20, T8N, R25E
		33-17 Mine C	NE1/4, S33, T8N, R26E
		33-18 Mine E	SW1/4, S14, T8N, R25E
		33-19 Nies	NE1/4, S20, T7N, R26E
		33-20 Number Three	SE1/4, SW1/4, S14, T8N, R25E
		33-21 Republic (also see Gustafson)	S32, T8N, R26E
			W1/2, S4,8, T7N, R26E
		33-22 Section 16, A	S1/2, S16, T8N, R25E
		33-23 Section 16B	N1/2, S16, T8N, R25E
		33-24 Shepherd No. 2*	NE1/4, S17, T6N, R28E
		33-25 South of Divide	S25, T6N, R26E
		33-26 UK Mine	S3, 4, T7N, R26E

County	Quad (1:250,000)	Site # & Name	Legal Description
Musselshell (cont.)		33-27 Nelson	S18, T9N, R30E
		33-28 Cooper	S20, T7N, R26E
		33-29 Western	S4, T7N, R26E
		33-30 Antelope	S12, T5N, R25E
		33-31 Square Deal	S16, T8N, R25E
		33-32 Number Four	S16, T8N, R25E
		33-33 Janich	S1, T7N, R25E
		33-34 Oxbow	S17, T8N, R26E
Park	Billings	34-1 Aldridge Creek	NW1/4, S1, T9S, R7E
		34-2 Beattie Gulch	SE1/4, S6, T9S, R8E
		+34-4 Cooke City*	S25, T9S, R14E
		34-5 Eldridge Creek	SW1/4, S22, T2S, R8E
		+34-6 Glengarry*	SW1/4, S2, T9S, R14E
			NE1/4, S11, T9S, R14E
		+34-7 Gold Dust*	SE1/4, S11, T9S, R14E
		34-8 Kountz	SW1/4, NE1/4, S20, T3S, R8E
		+34-9 Little Daisy*	S12, T9S, R14E
		+34-10 McLaren	S10, 11, T9S, R14E
		34-11 Miner Creek	NW1/4, S26, T2S, R8E
		34-12 Morrison	SW1/4, S17, T3S, R8E
			SE1/4, S18, T3S, R8E
		34-13 Trail Creek 28	SW1/4, NE1/4, S28, T3S, R8E
		34-14 Trail Creek 34	NW1/4, S34, T3S, R8E
		34-15 Peter Pear	S31, T7S, R9E
Phillips	Wolf Point	36-1 King Creek	S17, 21, T25N, R24E
		36-2 Linda Kay	S12, T25N, R24E
		36-3 Montana	S10, 11, 12, T25N, R24E
Powder River	Ekalaka, Hardin	38-1 Boicourt	SW1/4, S14, T5S, R50E
		38-2 Carney	S18, T5S, R48E
		38-3 Flanigan (North Star)	S21, T2S, R50E
		38-4 Gentry	NE1/4, S18, T3S, R46E
		38-5 Kucher 11	S11, T5S, R50E
		38-6 Kucher 18	S18, T5S, R48E
		38-7 Manker	SW1/4, S9, T4S, R51E
		38-8 Peerless	S23, T4S, R50E

County	Quad (1:250,000)	Site # & Name	Legal Description
Powell	Butte	39-1 Nancy Helen	S25, T11N, R8W
		39-2 Anderson	SE1/4, SW1/4, S3, T10N, R10W
		39-3 Charter Oak	S36, T8N, R7W
		39-4 Emery	S3, T7N, R8W
		39-5 Gimlet et. al.	S14, 15, T10N, R9W
		39-6 Lily Orphan	S15, T8N, R6W
		39-7 Limestone Quarry	S5, 6, T10N, R9W
		39-8 Monarch	S30, 31, T8N, R6W
		39-9 Negroes Mine	S36, T9N, R7W
		39-10 Ontario	NW1/4, NE1/4, S22, T8N, R6W
		39-11 Phosphate Mill	S23, T9N, R10W
		39-12 Golden Anchor	S1, T8N, R7W
		39-13 Gravely	S2, T10N, R9W
		39-14 Hard Luck	S21, T8N, R6W
		39-15 Jefferson	S14, 15, T12N, R9W
		39-16 John McKay	S23, T11N, R7W
		39-17 Leadville	S36, T7N, R8W
		39-18 Kimball	S12, T8N, R7W
		39-19 Monarch	S30, 31, T8N, R6W
		39-20 Sure Thing	S15, T8N, R6W
Prairie	Miles City	40-1 Hurley	SW1/4, S28, T12N, R51E
		40-2 Spring Creek	NW1/4, S27, T12N, R51E
Prairie	Miles City	40-1 Spring Creek	S27, T12N, R51E
Ravalli	Hamilton	41-1 Red Rock	S2, T10N, R19W
		41-2 White Cloud	S2, T10N, R19W
Richland	Glendive, Wolf Point	42-1 Ahern	NE1/4, NW1/4, S26, T23N, R53E
		42-2 Flom	SW1/4, NE1/4, S31, T24N, R59E
		42-3 Fritchie	NW1/4, S26, T24N, R59E
		42-4 Gaffield	SE1/4, S20, T21N, R58E
		42-5 Gorsage	NE1/4, S18, T21N, R59E
		42-6 Buxbaum	SE1/4, S18, T27E, R56E
			SW1/4, S17, T27N, R56E
		42-7 Johnson	NE1/4, S7, T24N, R60E

County	Quad (1:250,000)	Site # & Name	Legal Description
Richland (cont.)	Glendive, Wolf Point	42-8 Lemieux, Park	SE1/4, S7, T27N, R56E
		42-9 Mine A	SE1/4, S31, T21N, R58E
		42-10 Mine B	NW1/4, S4, T20N, R58E
		42-11 Mine C	SE1/4, NE1/4, S27, T21N, R57E
		42-12 Motzko	SE1/4, S6, T23N, R59E
		42-13 Panasuk	NE1/4, NW1/4, S1, T23N, R56E
		42-14 Sorenson	NW1/4, S26, T21N, R57E
		42-15 Vaira	SW1/4, S12, T24N, R54E
		42-16 Lambert	S33, T22N, R55E
Roosevelt	Wolf Point	43-2 Dawson	NW1/4, S31, T27N, R58E
		43-3 Fralick	SW1/4, S29, T27N, R58E
		43-6 Larson	NE1/4, SW1/4, S7, T28N, R57E
		43-7 McCann	S7, T27N, R57E
		43-9 North Culbertson	W1/4, S17, T28N, R56E
		43-11 Richards et. al.	NW1/4, S28, T30N, R58E
		43-12 Royan	SE1/4, S2, T29N, R55E
Rosebud	Hardin	44-4 NW Improvement	S26, 35, 36, T2N, R41E
		44-5 Rockwell	S29, T2N, R44E
Sanders	Wallace	45-1 Eddy Creek	S16, 21, T20N, R28W
		45-2 Jack White	S17, T22N, R32W
		45-3 Looters	SE1/4, S11, T21N, R31W
		45-4 State Group	S14, 23, T20N, R28W
		45-5 Broken Hill	S10, T27N, R34W
		45-6 Frederick	S13, 24, T27N, R34W
		45-7 Golden Rod	S8, T23N, R32W
		45-8 Gopher Hole	S10, T27N, R34W
		45-9 Holliday	S25, 26, T26N, R34W
		45-10 Montro Gold	S3, T19N, R26W
		45-11 Raven	S4, T21N, R28W
		45-12 Amazon	S25, T27N, R34W

County	Quad (1:250,000)	Site # & Name	Legal Description
Sheridan	Wolf Point	46-1 Acme Coal	SE1/4, S13, T34N, R57E
		46-3 Bergh	SE1/4, S22, T35N, R52E
		46-4 Carpenter	NW1/4, S20, T33N, R56E
		46-5 Community Coal	SW1/4, S27, T36N, R54E
		46-9 Lipska	NW1/4, S27, T34N, R55E
		46-11 Meyer	NE1/4, S5, T35N, R58E
		46-13 Olsen	SE1/4, S31, T35N, R55E
		46-15 Raymond	W1/4, S6, T36N, R55E
		46-16 Seaberg	NW1/4, S1, T36N, R53E
		46-17 Storaasci	NW1/4, S6, T34N, R55E
		46-18 Strip Mine A	SW1/4, SE1/4, S4, T35N, R58E
		46-19 Strip Mine B	S8, T34N, R58E
		46-20 Tobin	S10, T37N, R52E
		46-22 Wheeler, Lagerquist	SE1/4, SW1/4, S10, T35N, R58E
		46-23 Redstone	S5, T35N, R52E
		46-24 Coalridge	S8, T34N, R58E
Silver Bow	Butte	47-1 Buzton	S3, T2N, R9W
		47-2 Climax	S10, T3N, R8W
		47-3 Colorado Tails	S23, T3N, R8W
		47-4 Fish Creek	S31, 32, T1N, R7W
		47-5 German Gulch	S6, T2N, R10W
		47-6 Mountain Consol	S29, T4N, R7W
		47-7 Overlook	S15, T1N, R7W
		47-8 Peabody	S6, T1S, R8W
Stillwater	Billings	48-1 Hillcrest	S1/2, S20, T4S, R16E
		48-2 Mine 28, 29	S28, 29, T4S, R17E
Wilbaux	Glendive	55-1 Stair	SE1/4, S2, T15N, R59E
		55-2 U.G. Coal, Black Diamond	S10, T13N, R60E

Existing Land Use Planning

In the State of Montana, ten (80%) of the 56 counties do not have comprehensive land use plans completed. Of the 43 counties that contain AML sites, only 6 counties have compiled existing land use maps. The completed maps are at a scale of 1" = 2 miles and were published in 1977. The AML staff will use the land use maps when formulating reclamation plans for mapped areas.

Where land use maps are not available for counties containing AML sites, County Commissioners, County Planning Boards, and Planning Directors shall be consulted. Reclamation efforts in counties where comprehensive land use plans are not yet completed shall be proposed to restore the impacted site to a degree consistent with surrounding lands.

Reclamation in those counties where land use maps are available shall be carried out to conform with the land use indicated.

Reclamation Scheduling and Cost Proposals

During the three year period covered by this plan, the reclamation activities to be conducted include:

1. The development of an economically feasible acid mine drainage abatement plan for coal and non-coal AML sites in Montana. The use of permanent neutralizing and treatment facilities will not be considered at this time due to high initial costs and subsequent annual operation and maintenance costs. Adequate abatement measures, when put into effect, would eliminate mine acids and toxic metals from 40 miles of stream in the Sand Coulee Creek, Belt Creek, and Prickly Pear Creek basins. As the inventory is completed and other eligible waters are identified, successful and cost effective abatement techniques will be implemented.

2. The development and implementation of a comprehensive plan to extinguish and dispose of burning coal refuse piles. Three individual sites have been identified in Montana that are in proximity to urban areas. An estimated 70 to 100 acres are affected.

3. Effectively closing unobstructed mine openings, both horizontal and vertical, to prevent accidental entry. Each individual mine opening will present different problems. The most efficient and cost effective method of closure will need to be determined on an individual basis. Every coal field and mining district in Montana is plagued by open mine entrances. Because of the frequency of occurrence of mine openings, mine closure will be included as a part of the total reclamation plan at each eligible site. However, in the case of an emergency situation where a mine opening is threatening the public health, safety, and general welfare, immediate measures will be taken to abate the problem.

4. Develop and implement effective and cost efficient measures to remove or re-contour barren mine waste piles and determine those species of native and introduced grasses and shrubs that can be established on treated mine wastes. From the completed inventory to date it has been estimated there are 5300 to 6500 acres in Montana that are possibly eligible for reclamation under the AML program. Barren mine waste piles comprise the bulk of the visible disturbance and create serious environmental degradation. Re-contouring and revegetating mine waste piles shall proceed as a part of the total reclamation plan at eligible sites.

5. Determine whether or not abandoned mine structures have any cultural or historic significance. Where such significance does not exist and consent of the property owner has been obtained, deteriorating structures shall be removed. Removal of old structures shall proceed as a part of the total reclamation plan at eligible sites. However, in the case of an emergency situation where an abandoned structure is threatening the public health, safety, and general welfare, immediate measures will be taken to abate the problem.

Cost Proposals

In fiscal year 1979, the revenues generated in Montana for the AML Reclamation Fund equaled $10,827,453. Fifty percent of this figure is allotted to the Montana AML State Reclamation Fund. The total amount in the Montana AML Reclamation Fund as of March, 1980 totaled $8,100,927.00. At current coal production rates, the Montana AML State Reclamation Fund can be expected to increase by $6,000,000 annually for the three-year period covered by this plan.

Listed below are the sites tentatively scheduled for reclamation work during the three-year period of this plan. As the Montana AML site inventory continues, those sites found to be of higher priority will be included with, or replace those sites of lower priority that are on the schedule. The work list for each site is tentative as are the estimated costs of reclamation. Extensive on-site investigation and research of current reclamation methods and costs will yield more accurate cost proposals when each project is delt with individually.

The costs quoted are taken from U.S.E.P.A. publication 440/9-75-007 (1975). Since this publication is five years old, all the cost figures should be considered baseline. A gross national product price deflator scaling factor of 1.372 multiplied by the cost listed will convert the costs to 1980 dollars.* This is a crude conversion factor; more accurate factors could be obtained by using the idices pertaining to each particular service or commodity needed.

Alta Mine Hardrock

One Class IV Mine Seal	$45,000/Seal -	$45,000
One Class I Mine Seal	$5,500/Seal -	$5,500
Channel Diversion		$125,000
Ten Acres Contour and Revegetate	$16,900/Acre -	$169,000
		$344,500

*Source: Montana Department of Community Affairs; May, 1980. Increase from 1975 to the first quarter of 1980.

Bear Creek Coal

Four Class I Mine Seals	$5,500/Seal -	$22,000
Three Structures Removal	$3,000/Str. -	$9,000
Eighty Acres Contoured & Revegetated	$16,000/Acre -	$1,280,000
		$1,311,000

Belt-Sand Coulee Coal

Twelve Class IV Mine Seals	$45,000/Seal -	$540,000
Thirteen Class III Mine Seals	$22,000/Seal -	$286,000
Fifty-five Class I Mine Seals	$5,500/Seal -	$302,500
One hundred acres contour and revegetate	$25,000/Acre -	$2,500,000
Ten structures removal	$3,000/Str. -	$30,000
Subsidence Control	$200/Sq Yd-	$100,000
		$3,758,500

Bertha Hardrock

Remove, dispose & revegetate dump & disturbed area		
Three acres steep slope:	$465,000/Acre -	$1,395,000
Three acres moderate slope	$50,000/Acre -	$150,000
		$1,545,000

Block P Hardrock

Channel Diversion:		$125,000
Twenty Acres Contour and Revegetate	$14,300/Acre -	$286,000
		$411,000

Blue Bird Mine Hardrock

Two Class IV Mine Seals	$45,000/Seal -	$90,000
Unstable Structure Removal	$3,000/Str. -	$3,000
		$93,000

Cooke City Hardrock

Remove, dispose of dump material; waste and disturbed areas:	
Ten acres at $50,000/acre	$500.000

Corbin Flats Hardrock

Remove tailing from creek channel, stabilize channel - 8 acres @	$30,800/Acre -	$246,400
Contour & revegetate 45 acres @	$14,300/Acre -	$643,500
		$889,900

Fairview Coal

Three Class I Mine Seals	$5,500/Seal -	$16,500
Subsidence Contour	$2/Sq Yd-	$250.000
		$266,500

Hughesville Hardrock

One Class IV Mine Seal	$45,000/Seal -	$45,000
Channel Diversion		$100,000
		$145,000

Klein Coal

One Class I Mine Seal	$5,500/Seal -	$5,500
Extinguish Burning Dump - 50,000 cu. yd.	$2/Cu yd-	$100,000
Thirty acres of disturbed ground & revegetate	$300/Acre	$9,000
		$114,000

Mammoth Hardrock

One Class IV Mine Seal	$45,000/Seal -	$45,000
One Class III Mine Seal	$22,000/Seal -	$22,000
Three Class I Mine Seals	$5,500/Seal -	$16,500
Fifteen Acres Contour & Revegetate	$14,300/Acre -	$214,500
		$298,000

Mike Horse Hardrock

One Class IV Mine Seal	$45,000/Seal -	$45,000
Three Class I Seals	$5,500/Seal -	$16,500
Ten Acres Contour & Revegetate	$25,000/Acre -	$250,000
Two Structures Removal	$3,000/Str. -	$6,000
		$317,500

Red Lodge Coal

Two Class I Mine Seals	$5,500/Seal -	$11,000
Twenty-five Acres Contour & Revegetate	$14,300/Acre -	$357,500
Subsidence Control	$2/Sq Yd-	$150,000
		$518,000

Rimini Hardrock

Two Class IV Mine Seals	$45,000/Seal -	$90,000
One Acre Contour & Revegetate	$14,300/Acre -	$14,300
		$104,300

Washington Mine Hardrock

Three Class IV Mine Seals	$45,000/Seal -	$135,000
One Class I Mine Seal	$5,500/Seal -	$5,500
Six Acres Contour and Revegetate	$16,900/Acre -	$101,400
Three Structures Removed	$3,000/Str. -	$9,000
Channel Diversion		$100,000
		$350,900

The total for these estimated construction costs is $10,967,100 (1975 dollars). This total equals $15,046,861 in 1980 dollars (1.372 x 10,967,100). Additional costs to be considered include:

- An additional 20% of the construction costs (1980) for personnel, fringe benefits, travel, equipment, supplies, consulting services, miscellaneous costs, and direct charges $3,009,372

- An additional $142,000 for staff wages

The total of these additional costs ($3,151,372) plus construction costs ($15,046,861) equals $18,198,233 of work projected to be done over the three-year period of the plan.

The noncoal projects were selected meeting requirements of section 884.12 and state laws 26.4.123, 26.4.124; and 26.4.223, 26.4.224. The governor will designate these projects as meeting these requirements prior to grant application.

Section 884.13(f)(4)

TABLE
LANDS AND WATERS AFFECTED

Year	To be Reclaimed Acres Land	Miles Stream	Total Remaining Acres Land	Miles Stream
Initial	---	---	6600	190
1980	187	22	6413	168
1981	251	25	6162	143
1982	250	13	5912	130

1980:	Cooke City Project	(H.R.)	20 Acres	4 Miles
	Klein Mine	(Coal)	80	-
	Mammoth Mine	(H.R.)	15	5
	Prickly Pear Drainage	(H.R.)	72	13
1981:	Belt/Sand Coulee Drainages	(Coal)	150	20
	Fairview Project	(Coal)	100	--
	Rimini Project	(H.R.)	1	5
1982:	Bear Creek Drainage	(Coal)	80	--
	Block P Mine	(H.R.)	20	--
	Hughesville Mine	(H.R.)	100	8
	Mike Horse Mine	(H.R.)	10	5
	Red Lodge Project	(Coal)	40	--

H.R. - Hardrock Mine Site
Coal - Coal Mine Site

Site Description Sheets

EXPLANATION OF SITE SHEETS

Site description sheets are filled out at each site visited. The field data gathered is necessary in determining the eligibility of a site for reclamation work. Table 8 shows the county code used to order the site description sheets. The health, safety, and general welfare key-words used on line 17 of the site description sheets can be seen in Figure 1. Table 9 shows the estimated cost and duration categories on line 25 of the site description sheets.

Table 8 - County Code

County Code	County Code
Beaverhead - 1	Madison - 29
Big Horn - 2	Meagher - 30
Blaine - 3	Mineral - 31
Broadwater - 4	Missoula - 32
Carbon - 5	Musselshell - 33
Carter - 6	Park - 34
Cascade - 7	Petroleum - 35
Choteau - 8	Phillips - 36
Custer - 9	Pondera - 37
Daniels - 10	Powder River - 38
Dawson - 11	Powell - 39
Deer Lodge - 12	Prairie - 40
Fallon - 13	Ravalli - 41
Fergus - 14	Richland - 42
Flathead - 15	Roosevelt - 43
Gallatin - 16	Rosebud - 44
Garfield - 17	Sanders - 45
Glacier - 18	Sheridan - 46
Golden Valley - 19	Silver Bow - 47
Granite - 20	Stillwater - 48
Hill - 21	Sweetgrass - 49
Jefferson - 22	Teton - 50
Judith Basin - 23	Toole - 51
Lake - 24	Treasure - 52
Lewis & Clark - 25	Valley - 53
Liberty - 26	Wheatland - 54
Lincoln - 27	Wibaux - 55
McCone - 28	Yellowstone - 56

Table 9 -Keywords for Health, Safety, and General Welfare Problems

VO = VERTICAL OPENING

Any AML-related vertical or steeply inclined excavation or surface opening, regardless of proximity to populated areas, that is large enough for a child to fall through and be injured, and is not adequately sealed or barricaded.

Table 9- Keywords for Health, Safety, and General Welfare Problems (cont.)

P = PORTAL

Any AML-related surface entrance to a drift, tunnel, adit, or entry that is nearly level, is not sealed and is located within close proximity to a populated area, public road or other public use area.

SB = SURFACE BURNING

Any AML-related continuing incidence of surface burning resulting in smoke, haze, heat, or venting of hazardous gases.

GUB = GASES - UNDERGROUND BURNING

Any AML-related continuing smoke, haze, or venting of hazardous gases from underground coal combustion.

GHE = VENTING OF HAZARDOUS OR EXPLOSIVE GASES (NO UNDERGROUND BURNING)

AML-related venting of hazardous gases not related to combustion, or venting of explosive gases.

DPE = DANGEROUS PILE OR EMBANKMENT

Any AML-related refuse pile or embankment that is considered a health or safety problem because of unstable slopes or wind blown particulate matter, and is located within close proximity to a populated area, public road or other public use area.

DI = DANGEROUS IMPOUNDMENT

Any AML-related water catchment basin, naturally formed or artifically built, which is dammed or excavated for the retention of water, sediment, or waste, and poses a threat to the safety of life or property. Such an impoundment is currently leaking and/or structurally unsound or subject to dangerous transient water flow conditions and is located upstream of man-made structures or populated areas.

DS = DANGEROUS SLIDE

Any AML-related slide area endangering populated or improved areas or which could cause the impoundment of water or the breech of an existing impoundment.

DH = DANGEROUS HIGHWALL

Any AML-related unprotected dangerous highwall located in close proximity to a populated area, public road, or other public use area.

PWSAI = POLLUTED WATER RESOURCE (AGRICULTURE-INDUSTRIAL)

Any surface or subsurface water used for agricultural or industrial purposes that does not meet standards, (especially those for suspended solids, acid or alkaline conditions, heavy metals concentrations, and radioactivity) because of AML-related impact.

Table 9-Keywords for Health, Safety, and General Welfare Problems (cont.)

PWSHC = POLLUTED WATER RESOURCE (HUMAN CONSUMPTION)

Any surface or subsurface water used for human consumption or recreational waters used for swimming whose quality does not meet standards (especially those for suspended solids, acid or alkaline conditions, heavy metals concentrations and radioactivity) because of AML-related impact.

S = SUBSIDENCE

Any surface expression of AML-related subsidence such as tension cracks, potholes, troughs, or caving whose impact affects populated areas or affects the utilization of improvements.

CS = CLOGGED STREAM

Flooding caused by AML-related sedimentation or degraded water retention characteristics which affects populated areas, property or improved lands.

ANEF = ATTRACTIVE NUISANCE (MINING EQUIPMENT OR FACILITIES)

AML-related hazardous equipment or facilities located within close proximity to populated areas along public roads, or other public use areas.

ANW = ATTRACTIVE NUISANCE (INDUSTRIAL OR RESIDENTIAL WASTE)

Unauthorized and dangerous use of AML-impacted areas for residential or industrial waste disposal.

AWB = ATTRACTIVE WATER BODY

Any non-polluted, impounded water, regardless of depth or surface area, that is considered an attractive nuisance and is located within close proximity to a populated area, public road, or other public use area.

Table 10 - Cost Categories, Duration Categories

Estimated cost categories for each method described. Cost categories are:

1 = Less than - $ 10,000
2 = $10,000 - $100,000
3 = $100,000 - $500,000
4 = $Over - $500,000

Estimated duration categories, to implement each method described. The categories are:

1 = less than 1 month
2 = 1 - 12 months
3 = 1 - 3 years
4 = over 3 years

Index to AML Site Sheets*

Coal

County		Pages
Blaine		
	Dehl et. al.	3-1
	Perkins	3-5
	Vandeven	3-6
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	Lombard	4-1
Carbon		
	Bear Creek Strip Mine	5-1
	Foster Gulch	5-3
	Foster Gulch Strip Mine	5-4
	Red Lodge NE	5-9
	Red Lodge SE	5-10
	Smith Mine	5-12, A, B
	Washoe Dump	5-13
Cascade		
	Antelope Creek	7-1 —
	Antelope Creek Subsidence	7-2 —
Pilgrim	(Armington)	7-3 —
	Armington Coulee	7-4 —
	Belt A	7-5 BM-1
	B & M Coulee	7-6 —
	Centerville A	7-7 —
	Brown	7-8 —
	Centerville B	7-9 —
	Centerville C	7-10 —
	Centerville E	7-12 —
Heal	(Centerville F	7-13 —
	Centerville G)	7-14 —
	Centerville Mobile Homes	7-16 —
?	Cottonwood Seeps	7-17 —
	Cozzens et. al.	7-18
	East Belt Mine	7-19 —
	Giffen	7-20 SCM 4
	Lewis Coulee	7-24 BM 3
	North Belt	7-26 —
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	Number Five Coulee	7-28 —
	Number Five Coulee Mouth	7-29 SS7
	Sand Coulee Mid Town	7-32 SCM 11
	Sand Coulee North	7-33 —
	SE Belt	7-34 —
	Stockett NE	7-36 —
	Stockett SE	7-37 —
	Stockett West Ridge	7-38 —

*Sites visited Fall, 1979

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	Tracy NE, A	7-41 SCM 15
	Tracy NE, B	7-42 SCM 7
	Tracy South	7-43 —
	Tracy SW	7-44 SS 5
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	Upper Cottonwood B	7-46 —
	Upper Cottonwood C	7-47 SCM 9
	Upper Sand Coulee A	7-48 SCM 6
	Upper Sand Coulee B	7-49 SCM 2 & 3
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	Brown	14-2
	C. McDonald	14-3
	Divide	14-4
	Phillips	14-9
	Skaggs	14-10
	Small Prospects	14-11
	Swanson	14-12
Hill		
	Larson	21-2
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	SCS 29, 30	21-7
	SCS 31	21-8
	Hard Rock	
Cascade		
	Molton	7-25
	Queen of the Hills	7-31
Fergus		
	Giltedge	14-7
Jefferson		
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	Bertha	22-2
	Bluebird	22-3 A, B
	Corbin Flats	22-4
	Gregory	22-5
	Liverpool	22-6
	Washington	22-7 A, B
Judith Basin		
	Block P	23-1
	Hughsville Tailings	23-4

Index to AML Site Sheets*

Coal

County		Pages
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	Perkins	3-5
	Vandeven	3-6
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	Lombard	4-1
Carbon		
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	Foster Gulch	5-3
	Foster Gulch Strip Mine.	5-4
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	Red Lodge SE	5-10
	Smith Mine	5-12, A, B
	Washoe Dump	5-13
Cascade		
	Antelope Creek	7-1
	Antelope Creek Subsidence	7-2
	Armington	7-3
	Armington Coulee	7-4
	Belt A	7-5
	B & M Coulee	7-6
	Centerville A	7-7
	Brown	7-8
	Centerville B	7-9
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*Sites visited Fall, 1979

Index to AML Site Sheets (cont.)

County		Pages
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	Upper Sand Coulee B	7-49
Fergus		
	Brown	14-2
	C. McDonald	14-3
	Divide	14-4
	Phillips	14-9
	Skaggs	14-10
	Small Prospects	14-11
	Swanson	14-12
Hill		
	Larson	21-2
	Roberts	21-6
	SCS 29, 30	21-7
	SCS 31	21-8
	Hard Rock	
Cascade		
	Molton	7-25
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Fergus		
	Giltedge	14-7
Jefferson		
	Alta Mine	22-1, A, B, C
	Bertha	22-2
	Bluebird	22-3 A, B
	Corbin Flats	22-4
	Gregory	22-5
	Liverpool	22-6
	Washington	22-7 A, B
Judith Basin		
	Block P	23-1
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Index to AML Site Sheets (cont.)

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	Little Daisy	34-9
	McLaren	34-10

LOCATIONAL AND SUPPORTING INFORMATION

1. PA ID No:_____ PU ID No:_____ State/County Code: Mt/3
2. PA Name: Vandeven
3. Reviewer: Mark Carlstrom and Ben Mundie, DSL
4. Record Creation Date: 10/31/79 Date of last verification:
5. Source of data: Site visit
6. Quad Names: Havre (1:250,000)
7. Submission of Quad Maps: Yes x No
   If No, Give Lat/Lon:_____ or Township/Range/Section: T 34N R 19E S 23
8. Associated Problem Areas:
   Contributing to this PA:
   Impacted by this PA:
9. Date and Type of Last AML Mining: Underground coal
10. Are there any non-Coal AML problems in this Problem Area? Yes__ No x
11. Existing Mining Activity: Coal No Any Other
12. Coal Resources remaining? Yes x No Non-Coal Resources?
13. Predominant adjacent Land use: Ranching
14. Predominant adjacent Landcover: Stca, Arsm, Arlo
15. Are there any Previously Identified Post-Reclamation Plans for Reclaimed Lands in this Problem Area?: Yes__ No__ If so, what?:

- Apparent Sociologic and Demographic characteristics:

Ranching and oil fields

HEALTH, SAFETY, AND GENERAL WELFARE PROBLEMS

16. Any Evidence of an Extreme Danger Situation? Yes_____ No x

17. Health, Safety, Welfare Keywords & Occurrences:

18. Comments on Health, Safety, Welfare Problems:

19. Disturbed Areas causing Problems (acid, erosion, aesthetic, ...) on AML lands:

Type of Disturbed Area	Areas Needing Reclamation: No. Sites	Total Acres	Comments on Restoration Problems
Spoil Areas	2	____	Eliminate spoils by either: removing, burying, burning, remining, sealing; contouring, topsoiling, and revegetating; or a combination thereof.
Bench	__	____	
Pits	__	____	
Gob	__	____	
Slurry	__	____	
Haul Roads	__	____	
Other(Tipple, debris,...)	__	____	
Adits, Shafts	__	____	Caved

20. Trapped or Impounded Surface Water causing Problems at Mine Sites:
Acres:_____ Number of Occurrences:_____
Comments on Problems:_____

21. Polluted Water Leaving Mined Sites:
No. of Surface Mine Occurrences:_____ No. of Deep Mine Occurrences:_____
Comments on Problems:_____

22. Polluted Water Leaving the Problem Area: Yes_____ No__x__

23. Feet of "Visible" AML Highwall in PA:_____

24. Comments on Environmental or Restoration Problems:

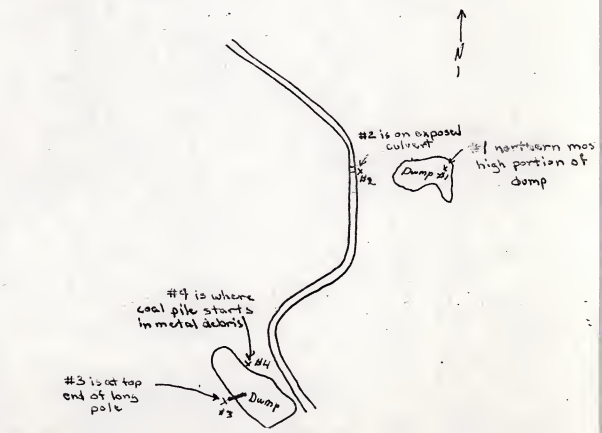
RECLAMATION ALTERNATIVES

25. Description of Reclamation Alternatives:
(Applicable methods, cost estimate categories, duration estimate categories)

Description of the Method	Cost Code 1-2	Duration Code 1-2
Eliminate dumps; contour, topsoil, and revegetate dumps and disturbed areas.		

COMMENTARY: No water was found at the site. The disturbance consist of 100% dump. The slope of the site is 35% with a N aspect.

Site Sketch:



LOCATIONAL AND SUPPORTING INFORMATION

1. PA ID No:_____ PU ID No:_____ State/County Code:_____
2. PA Name: Bear Creek strip mine
3. Reviewer: Mark Carlstrom DSL and Ben Mundie DSL
4. Record Creation Date: 9/07/?? Date of last verification:_____
5. Source of data: Site visit
6. Quad Names: Billings (1:250,000)
7. Submission of Quad Maps: Yes x No___
   If No, Give Lat/Lon:_____ or Township/Range/Section: T 85 R 21E S 6
8. Associated Problem Areas:
   Contributing to this PA:_____
   Impacted by this PA:_____
9. Date and Type of Last AML Mining: Strip mine - coal
10. Are there any non-Coal AML problems in this Problem Area? Yes__ No x
11. Existing Mining Activity: Coal No Any Other_____
12. Coal Resources remaining? Yes x No__ Non-Coal Resources?_____
13. Predominant adjacent Land use: Grazing
14. Predominant adjacent Landcover: Artr, 2 poa spp
15. Are there any Previously Identified Post-Reclamation Plans for Reclaimed Lands in this Problem Area?: Yes__ No x If so, what?:_____
- Apparent Sociologic and Demographic characteristics:
  Ranching, coal mining

HEALTH, SAFETY, AND GENERAL WELFARE PROBLEMS

16. Any Evidence of an Extreme Danger Situation? Yes_____ No x
17. Health, Safety, Welfare Keywords & Occurrences: DH
18. Comments on Health, Safety, Welfare Problems: Strip mine has steep highwalls, but the area is remote.

19. Disturbed Areas causing Problems (acid, erosion, aesthetic, ...) on AML lands:

Type of Disturbed Area	Areas Needing Reclamation: No. Sites	Total Acres	Comments on Restoration Problems
Spoil Areas	2	____	Fill trench with spoil material; contour topsoil and revegetate.
Bench	__	____	
Pits	__	____	
Gob	__	____	
Slurry	__	____	
Haul Roads	__	____	
Other(Tipple, debris,...)	__	____	
Adits, Shafts	__	____	

20. Trapped or Impounded Surface Water causing Problems at Mine Sites:
Acres: _____ Number of Occurrences: _____
Comments on Problems: _____

21. Polluted Water Leaving Mined Sites:
No. of Surface Mine Occurrences: _____ No. of Deep Mine Occurrences: _____
Comments on Problems: _____

22. Polluted Water Leaving the Problem Area: Yes _____ No __x__

23. Feet of "Visible" AML Highwall in PA: _____

24. Comments on Environmental or Restoration Problems:

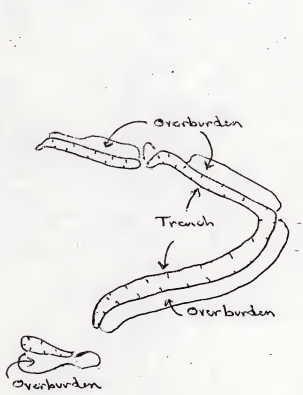
RECLAMATION ALTERNATIVES

25. Description of Reclamation Alternatives:
(Applicable methods, cost estimate categories, duration estimate categories)

Description of the Method	Cost Code	Duration Code
Backfill trenches with spoil material; contour, topsoil and revegetate.	3	3

COMMENTARY: Both the slope and aspect are variable at the location. The disturbance consists of 50% trench and 50% dumps. The geology is inter-bedded sandstones, shales and coal beds. No water at the site. The trench is up to 25 feet deep and 50 feet wide.

Site Sketch:



LOCATIONAL AND SUPPORTING INFORMATION

1. PA ID No: _____ PU ID No: _____ State/County Code: Mt/5
PA Name: Foster Gulch Strip mine
3. Reviewer: Mark Carlstrom DSL and Ben Mundie DSL

4. Record Creation Date: 9/26/79 Date of last verification: _____
5. Source of data: Site visit

6. Quad Names: Billings (1:250,000)
7. Submission of Quad Maps: Yes x No 8, 9
If No, Give Lat/Lon: _____ or Township/Range/Section: T 85 R 21E S16,1
8. Associated Problem Areas:
Contributing to this PA: _____
Impacted by this PA: _____
9. Date and Type of Last AML Mining: Strip mine - coal
10. Are there any non-Coal AML problems in this Problem Area? Yes__ No__
11. Existing Mining Activity: Coal No Any Other
12. Coal Resources remaining? Yes x No Non-Coal Resources? _____
13. Predominant adjacent Land use: Grazing
14. Predominant adjacent Landcover: Artr, Poason (Z)
15. Are there any Previously Identified Post-Reclamation Plans for Reclaimed Lands in this Problem Area?: Yes__ No x If so, what?: _____
- Apparent Sociologic and Demographic characteristics:
Ranching and coal mining

HEALTH, SAFETY, AND GENERAL WELFARE PROBLEMS

16. Any Evidence of an Extreme Danger Situation? Yes _____ No x

17. Health, Safety, Welfare Keywords & Occurrences: DH

18. Comments on Health, Safety, Welfare Problems: Several steep highwalls that could endanger livestock grazing in the area.

19. Disturbed Areas causing Problems (acid, erosion, aesthetic, ...) on AML lands:

Type of Disturbed Area	Areas Needing Reclamation: No. Sites	Total Acres	Comments on Restoration Problems
Spoil Areas	several	____	Bury spoils in trenches; contour, topsoil, and revegetate.
Bench	__	____	
Pits	__	____	
Gob	__	____	
Slurry	__	____	
Haul Roads	1	____	Backfill cuts. Contour topsoil and revegetate.
Other (Tipple, debris, ...)	__	____	
Adits, Shafts	__	____	

20. Trapped or Impounded Surface Water causing Problems at Mine Sites:
Acres:_____ Number of Occurrences:_____
Comments on Problems:_____

21. Polluted Water Leaving Mined Sites:
No. of Surface Mine Occurrences:_____ No. of Deep Mine Occurrences:_____
Comments on Problems:_____

22. Polluted Water Leaving the Problem Area: Yes_____ No_x_

23. Feet of "Visible" AML Highwall in PA: see air photo

24. Comments on Environmental or Restoration Problems:

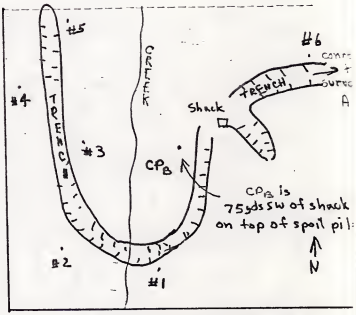
RECLAMATION ALTERNATIVES

25. Description of Reclamation Alternatives:
(Applicable methods, cost estimate categories, duration estimate categories)

Description of the Method	Cost Code	Duration Code
Fill trenches with spoils; contour, topsoil, revegetate	3	3

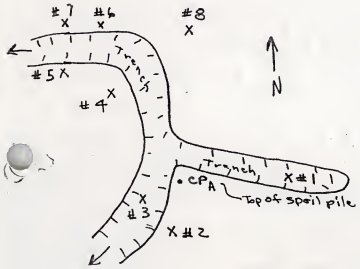
COMMENTARY: The upper area is on relatively gentle terrain. As the strip mine runs into the drainages the slopes increase to 50%. There are 20 to 30 acres of disturbance consisting of spoil dumps and trenches from strip mining. There is approximately 15 miles of trench which is up to 30 feet deep and 100 feet wide. Onsite vegetation consists of thistle, Ayer, Brte, Chna, Artr, and Poaspp. The geology consists of interbedded sandstone, shales and coal seams.

Site Sketch:



Lower Site - Survey B

Upper Site - Survey A



LOCATIONAL AND SUPPORTING INFORMATION

1. PA ID No:_____ PU ID No:_____ State/County Code: Mt/5
2. PA Name: Washoe Dump
3. Reviewer: Mark Carlstrom DSL and Ben Mundie DSL

4. Record Creation Date: 9/28/79 Date of last verification:_____
5. Source of data: Site visit

6. Quad Names: Billings (1:250,000)
7. Submission of Quad Maps: Yes x No
   If No, Give Lat/Lon:_____ or Township/Range/Section: T 8S R 20E S 1
8. Associated Problem Areas:
   Contributing to this PA:_____
   Impacted by this PA:_____
9. Date and Type of Last AML Mining: Underground coal
10. Are there any non-Coal AML problems in this Problem Area? Yes__ No x
11. Existing Mining Activity: Coal No Any Other
12. Coal Resources remaining? Yes x No Non-Coal Resources?_____
13. Predominant adjacent Land use: Ranching
14. Predominant adjacent Landcover: Artr, grassland, 2 poa
15. Are there any Previously Identified Post-Reclamation Plans for Reclaimed Lands in this Problem Area?: Yes__ No x If so, what?:_____

- Apparent Sociologic and Demographic characteristics:

Ranching

HEALTH, SAFETY, AND GENERAL WELFARE PROBLEMS

16. Any Evidence of an Extreme Danger Situation? Yes_____ No x

17. Health, Safety, Welfare Keywords & Occurrences:_____

18. Comments on Health, Safety, Welfare Problems:_____

19. Disturbed Areas causing Problems (acid, erosion, aesthetic, ...) on AML lands:

Type of Disturbed Area	Areas Needing Reclamation: No. Sites	Total Acres	Comments on Restoration Problems
Spoil Areas	1	____	Eliminate spoils by either: removing, burying, burning, remining, sealing; contouring, topsoiling, and revegetating; or a combination thereof.
Bench	__	____	
Pits	__	____	
Gob	__	____	
Slurry	__	____	
Haul Roads	__	____	
Other(Tipple, debris,...)	__	____	
Adits, Shafts	__	____	

20. Trapped or Impounded Surface Water causing Problems at Mine Sites:
Acres:_____ Number of Occurrences:_____
Comments on Problems:_____

21. Polluted Water Leaving Mined Sites:
No. of Surface Mine Occurrences:_____ No. of Deep Mine Occurrences:_____
Comments on Problems:_____

22. Polluted Water Leaving the Problem Area: Yes_____ No_x_

23. Feet of "Visible" AML Highwall in PA:_____

24. Comments on Environmental or Restoration Problems:

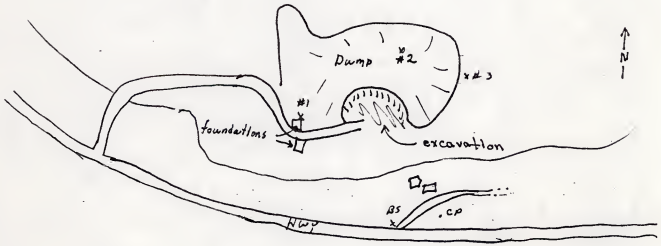
RECLAMATION ALTERNATIVES

25. Description of Reclamation Alternatives:
(Applicable methods, cost estimate categories, duration estimate categories)

Description of the Method	Cost Code	Duration Code
Eliminate dump; contour, topsoil, and revegetate dump and disturbed area.	2	2

COMMENTARY: The geology of the site consists of interbedded sandstone and shale with coal seams. The site has a 5-10% slope with a South aspect. Disturbance is 98% dump and 2% foundations. On site vegetation consists of Ratr, Artr, thistle, and grasses.

Site Sketch:



LOCATIONAL AND SUPPORTING INFORMATION

1. PA ID No:_____ PU ID No:_____ State/County Code: Mt/7
2. PA Name: Antelope Creek
3. Reviewer: Mark Carlstrom DSL and Ben Mundie DSL
4. Record Creation Date: 10/21/79 Date of last verification:_____
5. Source of data: Site visit
6. Quad Names: Great Falls (1:250,000)
7. Submission of Quad Maps: Yes x No
   If No, Give Lat/Lon:_____ or Township/Range/Section: T 19N R 5W S 5
8. Associated Problem Areas:
   Contributing to this PA:_____
   Impacted by this PA:_____
9. Date and Type of Last AML Mining: Underground coal
10. Are there any non-Coal AML problems in this Problem Area? Yes__ No x
11. Existing Mining Activity: Coal No Any Other_____
12. Coal Resources remaining? Yes___ No Non-Coal Resources?_____
13. Predominant adjacent Land use: Ranching
14. Predominant adjacent Landcover: Ruth, Stvi, Svspp, Chna, Amsp, Poaspp
15. Are there any Previously Identified Post-Reclamation Plans for Reclaimed Lands in this Problem Area?: Yes__ No x If so, what?:_____
- Apparent Sociologic and Demographic characteristics:
  Ranching and farming

HEALTH, SAFETY, AND GENERAL WELFARE PROBLEMS

16. Any Evidence of an Extreme Danger Situation? Yes_____ No x

17. Health, Safety, Welfare Keywords & Occurrences: IS

18. Comments on Health, Safety, Welfare Problems: Remote area

19. Disturbed Areas causing Problems (acid, erosion, aesthetic, ...) on AML lands:

Type of Disturbed Area	Areas Needing Reclamation: No. Sites	Total Acres	Comments on Restoration Problems
Spoil Areas	3	____	Eliminate spoils by either: removing, burying, burning, remining, sealing; contouring, topsoiling, and revegetating; or a combination thereof.
Bench	__	____	
Pits	__	____	
Gob	__	____	
Slurry	__	____	
Haul Roads	__	____	
Other(Tipple, debris,...)	__	____	
Adits, Shafts	3	____	Backfill and contour

20. Trapped or Impounded Surface Water causing Problems at Mine Sites:
Acres:_____ Number of Occurrences:_____
Comments on Problems:_____

21. Polluted Water Leaving Mined Sites:
No. of Surface Mine Occurrences:_____ No. of Deep Mine Occurrences:_____
Comments on Problems:_____

22. Polluted Water Leaving the Problem Area: Yes_____ No__x__

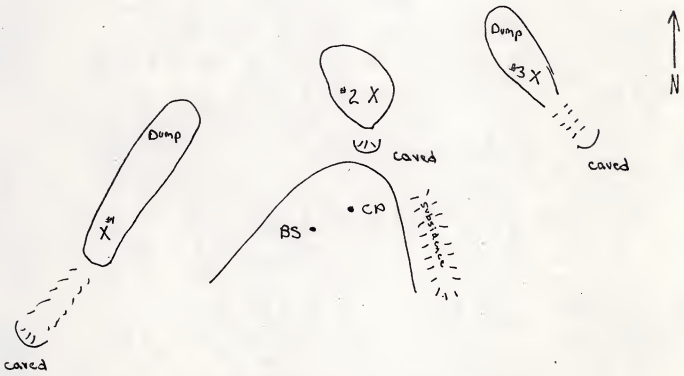
23. Feet of "Visible" AML Highwall in PA:_____

24. Comments on Environmental or Restoration Problems:

RECLAMATION ALTERNATIVES

25. Description of Reclamation Alternatives:
(Applicable methods, cost estimate categories, duration estimate categories)

Description of the Method	Cost Code 2	Duration Code 2
Eliminate dumps; backfill adits; contour, topsoil, and revegetate dumps and disturbed areas.		

COMMENTARY: The site has a North aspect with a slope that varies from 0-10%. The disturbance is 100% dumps and adits.

Site Sketch: